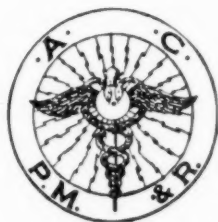

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Official Journal
American Congress of Physical Medicine and Rehabilitation
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VOLUME XXXV

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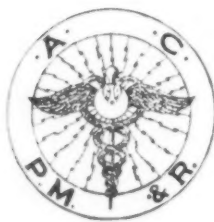
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ANNUAL SESSION • WASHINGTON, D.C. • SEPTEMBER 6-11, 1954

**American Congress of Physical Medicine
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**32nd Annual
Scientific and Clinical Session
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SEPTEMBER 6-11, 1954



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Contents — April, 1954

Volume XXXV

No. 4

ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION

(Formerly Archives of Physical Medicine)

30 North Michigan Avenue, Chicago 2, Illinois

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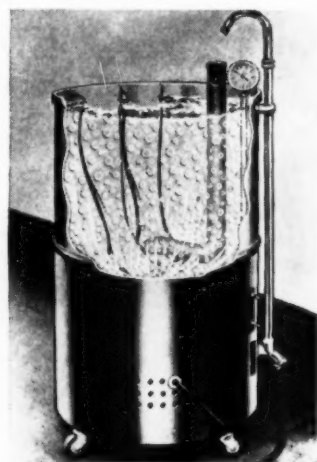
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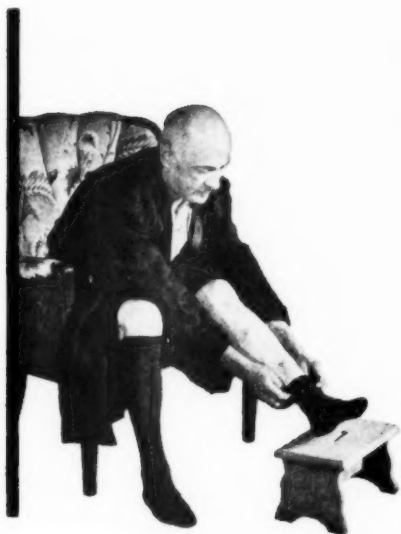
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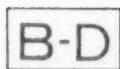
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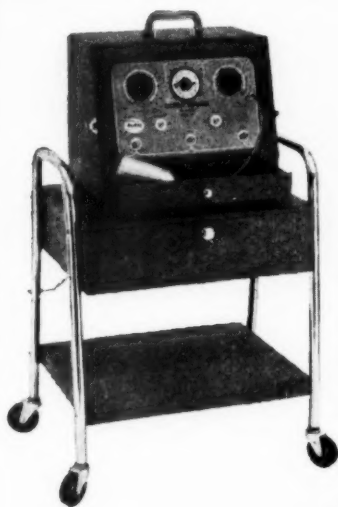
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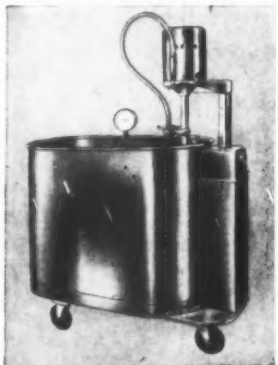
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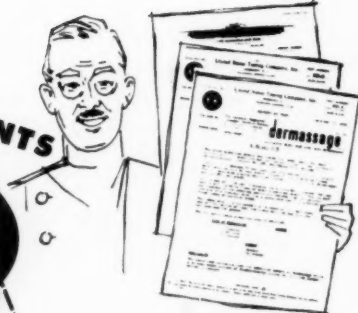
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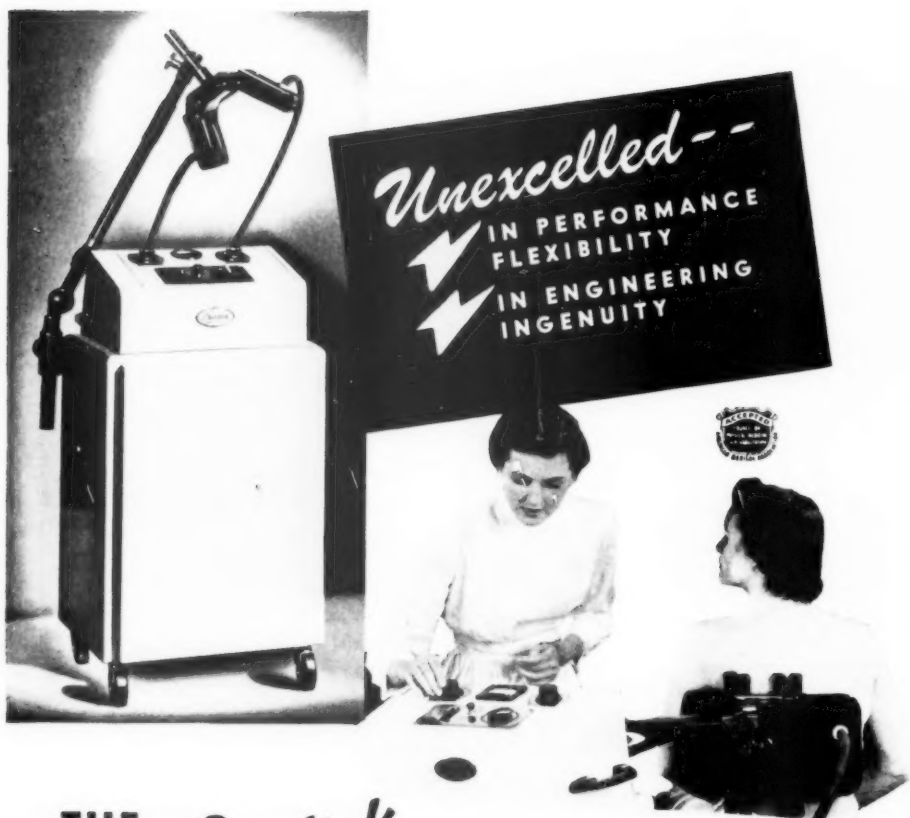
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Ultrasound in the Treatment of Scars

WILLIAM BIERMAN, M.D.
New York

It is difficult to evaluate any new therapeutic procedure on a clinical basis unless the results are immediate, dramatic, and consistent to a high degree. In recent years, new chemotherapeutic and endocrine preparations have proved themselves in a brief period of time because they fulfilled these characteristics. The clinical evaluation of physical measures, such as ultrasound, presents many difficulties because beneficial changes, if and when they do occur, (although at times promptly) are more gradual. They, therefore, cover a period of time before the presenting symptom disappears or is markedly ameliorated. During this period numerous variables may occur, such as the *vix naturae medicatrix* and psychological factors. A clinical situation, the treatment of which does lend itself to a high degree of objective evaluation, is that of scarring, particularly when it occurs on body surfaces. We have had the opportunity of treating several patients presenting such cicatrices.

One such patient, L. C., was an electrical engineer who suffered a severe burn of his left hand when he short circuited two high voltage terminals by touching them with his index finger and thumb. The webbed area between these two fingers was destroyed so that it required grafting which was performed four weeks after the accident. His hand was then held in pressure bandages which were removed about one month later, at which time he was referred to us. Measurements between two fixed points (one at the ulnar side of the beginning of the nail bed of the thumb

and the other at the radial terminus of the mid-crease of the proximal interphalangeal joint of the index finger), showed an ability to separate these two involved fingers a distance of three inches. Directly after each ultrasound treatment it was possible to detect an in-



Fig. 1—L.C.: scar between index finger and thumb.

creased ability to stretch these fingers apart. This distance could be measured with a high degree of accuracy by means of calipers. The increased span averaged one-eighth of an inch per treatment. The gain in range was in large measure retained. At the end of three months the span between the thumb and index finger of his left hand gained a little over one inch approaching that of the right (normal) hand to within one-eighth of an inch. He received a total of fourteen treatments. Examination one year later showed that he had retained all the gain he had made (fig. 1, chart 1).

About one year prior to his coming in for treatment, C. M., a young man seventeen years of age, had suffered an incised laceration of the middle finger extending from the distal portion of its anterior aspect, curving medially along this finger across the web between the middle and ring fingers and down into

Read at the Thirty-first Annual Session of the American Congress of Physical Medicine and Rehabilitation, Chicago, September 2, 1953.

Assistant Clinical Professor of Physical Medicine and Rehabilitation, Columbia University; Attending in Physical Medicine, Mt. Sinai Hospital, New York.

the palm of the hand. As a result of the contraction of the scar tissue, he had developed a flexion deformity of his ring and middle fingers. Because of the interphalangeal scar, which had ulcerated, he could separate these two fingers to a very limited degree. This ulceration was probably due to the tearing of the scar tissue in his continued effort to abduct these two fingers.

fingers but not to the same degree as on the uninvolved fingers. However, none of these limitations interfered with any of his activities.

J. G., a young woman, suffered lacerations to the left palmaris longus tendon and median nerve with the surgical repair of these structures on April 24, 1949. In addition to the limitation of the fingers and wrist motions, she had incurred

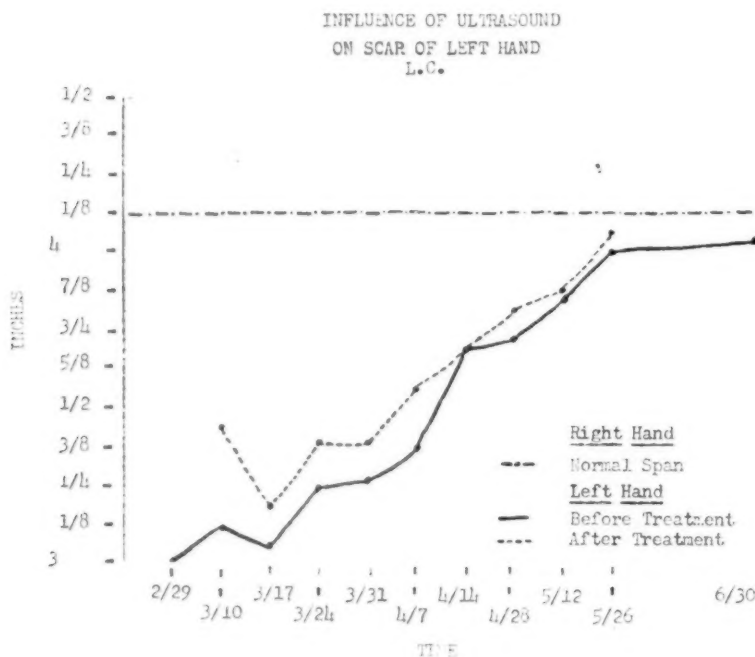


Chart I—L.C.: indicating span before and directly after each treatment.

He had received treatments in a well equipped department of Physical Medicine. These had proved inadequate and he had been advised to undergo plastic surgery. During the course of thirty-six ultrasound treatments, covering a period of three and one-half months, he was gradually able to extend the involved fingers and to separate them to a greater degree with the healing of the interdigital scar. He described his improvement dramatically by saying he was now able to do his usual handstands (fig. 2 and 3). Evaluation two years later revealed an ability to hyperextend all his

loss of sensation on the volar aspect of the thumb. She had been treated with various physical procedures, such as whirlpool baths, underwater exercises, and electrical stimulation. On January 24, 1951, twenty-one months after her injury, she was still unable to approximate the tips of her fingers to the palm of her hand. The distance from the tip of her middle finger to her palm was one and one-quarter inches. Three weeks later, after she had received six treatments with ultrasound, this distance was reduced to one inch. Two weeks subsequently it had narrowed to one-half



Fig. 2—C.M.: contractures following laceration of middle and ring fingers and of palm.



Fig. 3—C.M.: same case as in fig. 2; improved extension and abduction of involved fingers.

inch. After the ensuing three weeks, she could touch the palm of her hand. She was able to hold things in her left hand with greater strength and flexibility and could accomplish activities beyond her previous abilities, such as washing clothes and putting on her own earrings. The functional capacity of her left hand continued to increase during the following weeks so that at the time of her discharge, on May 16, 1951, she was able to tie her baby's shoes, braid her daughter's hair, and perform all her other household duties. She received a total of thirty treatments with ultrasound during a period of less than four months.

Dr. H. J. S. sustained x-ray burns of his hand and fingers from an overexposure during the course of his work as an orthopedist. In addition to the pain he experienced, he complained of limitation and difficulty in flexion and extension of the fingers. After the first ultrasound treatment, he stated that his pain was much reduced, so that for the first time in two months he was able to sleep through the night and without sedation. Residual pain disappeared rapidly and finger motions returned to a normal range at the completion of the treatments. He received a total of twelve treatments during a period of two months.

Five days after we received our first ultrasound apparatus, on June 7, 1950,

we had the opportunity of applying it to a patient (J. B.), who had suffered from Dupuytren's contracture of the palms of his hands. He was a hospital orderly in his sixties, who had known of this condition for a period of approximately six years. His left hand was moderately involved; his right but slightly. We treated the more severely involved left hand. After seven treatments he volunteered the statement that he felt his treated hand was "softer" and that he was "able to contract it better." A total of one hundred and one treatments during a period of nine months was administered. While some degree of tendon thickening and puckering of the skin still remained, they were considerably less than originally. Follow up two years later showed the palm of the hand to be as soft as it was at the time of his discharge.

It was much softer than the right (untreated) hand. The patient stated he was able to use his left hand without discomfort and in a normal fashion (fig. 4).

Technic

The apparatus employed produced oscillations of one megacycle per second. The surface area of each of the sound heads of the three machines employed was five square centimeters. Applications were made with the strength varying from one to two watts per square

centimeter. The duration of each treatment was from six to eight minutes. During this time the sound head was kept in continuous motion. Treatments were usually applied at intervals of about every other day. In most instances the energy was applied to the part immersed in water. Applications using mineral oil as the coupling substance were also made.



Fig. 4—J.B.: case of Dupuytren's contracture.

Discussion

The character of the changes produced in the living animal tissue following the application of ultrasound has been the subject of many inquiries. The one explanation which is widely accepted is the production of heat. This form of convective heating is stated to be different from that produced by electrical currents because of the varying acoustic impedance of tissues, particularly at their interfaces¹. The possibility of non-temperature effects is also recognized^{2,8}.

An additional mechanical, non-thermal explanation may be tenable as a result of the work performed by electron microscopists in preparation of tissues for examination (fig. 5). This technic has been described by Wolpers⁴, Gross and Schmitt⁵, and by others. These workers have separated the collagen fibers from each other by the use of sonic oscillations of approximately nine kilocycles per second. Higher frequencies can cause the same effect but may result in the

swelling of the fibrils⁶. Ruska reports that under experimental conditions, following the use of ultrasound, the collagen and also the finer reticulin fibrils will stay alive but the cement substance between the fibrils will be destroyed⁷. The changes produced in the cement substance, as well as in the collagen fibers, may account for the clinical improvement observed following the treatment of scars.

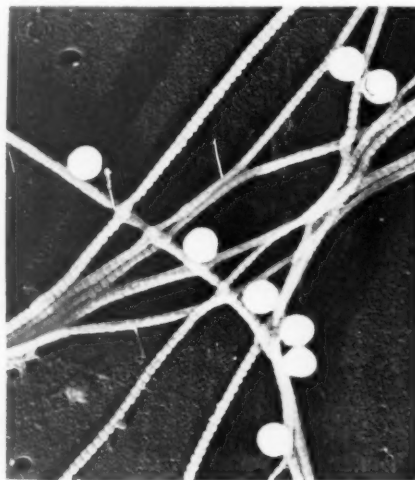


Fig. 5—Guinea pig skin, formalin fixed, x62,000, showing separation of collagen fibrils following application of ultrasound; circular objects are artefacts. (Made by Dr. S. K. Elster).

The moderately successful result to which we call attention in describing one case of Dupuytren's contracture does not, of course, prove the efficacy of this procedure in the treatment of this condition. We have had the opportunity of treating other patients suffering from Dupuytren's contracture. In early cases marked improvement was observed after a few treatments. In the older cases, the tissues appeared to become softened and finger motion increased, but did not return to normal because of persistent tendon contractures. More work will have to be done before a definite conclusion can be reached concerning the effectiveness of ultrasound in the treatment of the varying stages of this condition. It must also be realized that unlike that in traumatic scars, the causa-

tive factor in Dupuytren's contracture, whatever it may be, may continue to operate.

In the instance of the described case of Dupuytren's contracture, more than one hundred treatments were administered. Evidence of any damage in this case or in others was not observed. Ultrasound applications are not dangerous when applied with the usual therapeutic techniques.

Conclusion

Clinical evidence indicates the possibility of softening scar tissue by ultrasound. An explanation for the results observed may be the effect exerted by this energy on collagen fibers and on the interfibrillar cement substance.

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Discussion

Dr. George M. Piersol (Philadelphia): At this time when the therapeutic value of ultrasound is under considerable scrutiny in this country, a contribution such as Dr. Bierman's is desirable and should be encouraged. Only by critically evaluated and carefully controlled clinical studies will it be possible to arrive at

more definite conclusions relative to the effectiveness and safety of the use of ultrasonic energy in the treatment of diseases and disabilities in living humans. Dr. Bierman has presented objective evidence rather than mere impressions as a basis for his clinical observations. He has reported his results without making exaggerated claims.

No one appreciates better than he the difficulty of controlling observations on patients. His results, which are certainly suggestive, would be even more impressive had it been possible to treat a control group over an equal length of time by other methods.

We agree that the four cases of traumatic origin represent an entirely different category from the single case of Dupuytren's contracture, a condition which heretofore has failed to respond satisfactorily to any form of treatment other than early surgery.

The author's speculation as to the possible mechanisms by which the application of ultrasonic energy so favorably influenced scar tissue is interesting and ingenious.

We concur in his statement that to date there is no acceptable proof that the application of ultrasound produces *therapeutic* effects other than those due to *heat*. Admittedly, physicists have shown that when applied in sufficient energy ultrasound may produce *non-thermal* effects, one of which is *mechanical*. That significant mechanical effects result when this form of energy is applied therapeutically in safe dosage is open to serious doubt. Before the quoted observations made with the electron microscope on collagen tissues subjected to sonic oscillations can be used as an explanation of Dr. Bierman's results, it would be interesting to know how the dosage and energy level used in these experiments compares to the therapeutic doses employed.

To date we hardly are justified in regarding ultrasound when used as a therapeutic tool as anything more than an additional method of applying deep, well beamed heat. The method is not without the possibility of causing irreversible

destructive effects. Experimentally, at least, the heating effects of ultrasound are similar to those observed from the application of heat by less dangerous and more convenient methods.

Dr. Bierman's suggestive and successful results in the treatment of scar tissue by ultrasonic radiation should stimulate others to employ and investigate further similar treatment in suitable cases.

Relaxation of Spasticity by Physiological Technics

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In normal individuals with muscles at rest it is possible to move the various parts of a limb with relatively little resistance through a range of motion which varies in extent from joint to joint. This is known as passive movement and depends on non-contraction of agonist or antagonist muscles, as well as on non-impedance by ligaments and synovial surfaces of the joints. Inactivity of muscle, in turn, depends on volitional relaxation by the patient, although this may not be achieved without previous training. Volition, however, is of little importance at the end of the range where antagonists placed on stretch respond with reflex contraction and impede further passive movement even though considerable force be applied.

In many patients with central nervous system lesions, there is marked interference with such passive movement in ranges where no impedance occurs in the normal. This may vary both in degree and nature. Some show constant rigidity of muscles in their shortened position so that passive movement is difficult to initiate. Some show interference in the center of the range and motion is impeded at one particular point and at no

other. Some show alternate tightness and relaxation, the so-called "cog-wheel" effect. Many evidence limitation of passive movement at the end of the range. The different forms may all be present in the same individual. In all types, interference is dependent on the speed of the passive movement as well as the positioning of the extremity.

In man, the extensor muscles are primarily affected, except in the arm, where the flexors are involved. In animals, generally the extensor muscles are affected. There are exceptions, however; the ape with central nervous system lesions displays the same tonic contraction of the flexors in the arm as does man. The frog, which normally rests with flexed thighs, legs and arms, develops decerebrate rigidity in the flexor muscles. The pigeon, the flexor muscles of which maintain the position of the wing at rest, exhibits rigidity in these same muscles.

A generalization which accounts for the known muscular distribution of the phenomenon in most species is that it involves primarily the anti-gravity or posture maintaining groups of muscles. It has been thought to be due to an increased sensitivity of the stretch reflex, but this is an over-simplification. In fact, Kennard¹ has demonstrated, following parietal ablation in the monkey, a height-

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ened stretch reflex associated with flaccidity. Broadly and more accurately, spasticity may be described as an exaggeration of proprioceptive reflex function due to the absence of some normal factor which conditions such function². Absence is the key word in this definition. In central nervous system lesions which destroy higher nervous centers in the upper spinal cord, brain stem, cerebellum, or cerebrum, there is an accompanying enhancement of reflex activity of the remaining brain and cord substance. This has been assumed to be due to a release of reflexes from the inhibitory control of higher centers. More than a mere release from inhibition occurs, since facilitation is also a major factor³.

The term spasticity has been used to describe the phenomenon in man. In animals, the term decerebrate rigidity is employed to designate a state which differs only in degree from spasticity. Occasionally this latter term has also been used for profound spasticity in man. Sherrington⁴ first used the term in 1896 when he described a condition which followed removal of the cerebral hemispheres in the monkey. Jackson⁵ explained the release from inhibition which occurs in spasticity on the basis of an evolutionary hierarchy of nervous centers, in which disintegration resulted not merely in the loss of function in the specific part destroyed by disease, but in the positive reestablishment of a lower order of organization. Magoun⁶ has presented evidence that there is maintained activity of central facilitatory influences which augment spinal stretch reflexes when the impairment of central inhibition occurs.

Spasticity is not static in nature but is subject to autogeneous neurologic as well as environmental influences. In the acute lesion, spasticity does not develop as an "all or none" phenomenon. Rather it is integrated as part of the overall picture first of loss, and then return of motor function. In hemiplegia, for example, the first stage is flaccid paralysis due to "pyramidal" shock. In this stage there is neither voluntary movement nor spasticity. As time passes, incomplete voluntary

movements appear in the face, arm, trunk, and leg. Simultaneously, spasticity develops in these same areas. There is no absolute relationship between the degree of paralysis and the amount of spasticity. As a matter of fact, in hemiplegia, flaccid paralysis may persist beyond the stage of shock. However, if after the period of "pyramidal" shock, spasticity and a degree of voluntary motion appear, any further increase in the voluntary return is associated with a decrease in spasticity.

In man, spasticity is most marked in the flexor muscles of the upper extremity and the extensors of the lower, but this is not a constant feature. Brain⁷ has shown that when a hemiplegic patient assumes the quadrupedal position, the rigidity in the forearm shifts from the flexors to the extensors. Magnus⁸ emphasized that spasticity is not permanently present in any one muscle group. He felt that it could be made to shift in a predictable fashion under the influence of the tonic-neck reflexes by a changed relative position of head to body or body to head. The same variability was observed during testing for spasticity with the wrist in supination and again in pronation. With the wrist in pronation, for example, spasticity tends to shift from the flexors to the extensors of the elbow.

In patients with lesions of varying duration, whether acute, chronic or progressive, spasticity is influenced by many factors. In addition to the positioning of the extremity, or of the entire body, such as occurs in demonstrating the effect of the tonic-neck reflexes, stretch of the involved muscle itself is also important. It is the nature of the so-called lengthening and shortening reactions that passive movement, as employed to overcome either spasticity or decerebrate rigidity, in itself brings about inhibition of the hyperactive reflexes. With slow forceful passive motion, a spastic limb may be made to give way suddenly; the resulting elongation of spastic muscles is known as the *lengthening* reaction. If the limb is then returned to its original position, the muscles again assume their previous

state. This phase is then referred to as the *shortening reaction*.

Probably the most effective way to illustrate the plasticity of the phenomenon is to refer to the factors found by Sherrington⁸ to influence decerebrate rigidity. Sherrington found that decerebrate rigidity is inhibited readily by stimulation of various regions of the nervous system. Reflexes induced in decerebrate preparations cause contraction in one muscle group, accompanied by relaxation of spastic antagonists (the response labeled by Sherrington as reciprocal innervation). It is also apparent from his work that numerous peripheral afferent stimuli—cutaneous, proprioceptive and even mechanical—bring about reflex inhibition of spasticity.

Sherrington's findings were the result of his studies on the decerebrate animal. Actually, lesions in many parts of the central nervous system, including the reticular formation, cerebellum, vestibular apparatus, and spinal cord, may also produce spasticity. In man, the lesions are never as clearly defined as in the experimental animal, but the process and its manifestations vary only in degree from that in the animal.

Spasticity depends on an interrelated, dynamically functioning group of anatomically distinct areas in the brain and spinal cord. Some idea of this interrelationship may be gathered from experiments on suppression of spasticity. For example, in the decerebrate animal, stimulation of the anterior lobe of the cerebellar cortex results in suppression of spasticity, whereas, ablation of the same area produces an exaggeration of spasticity. The rigidity may be abolished by destruction of the vestibular nuclei or of the vestibulo-spinal tract. Previously mentioned was the role of the afferent roots in maintaining spasticity. But the afferents are only one link in the process. Chambers and Sprague⁹ demonstrated, in animals with rigidity following labyrinthectomy, that the loss which follows deafferentation may be restricted by ablation of the homolateral cortex of the anterior lobe of the cerebellum, or by

homolateral hemisection of the lower thoracic spinal cord.

Spasticity is a problem in man because it interferes with both passive and active movement. Because it does not remain static it tends either to improve or to become more severe. In patients with a progressive disease, spasticity will increase; but even patients with a static corticospinal lesion may show progression of spasticity. The latter is evident in patients with traumatic hemiplegia due to head injury. Flexor spasticity of the upper extremity gradually restricts the range of movement until in some individuals we find the arm curled up against the chest, with the wrist in flexion and the fingers tightly pressed into the palm of the hand. This occurs even if the original injury was incurred years previously.

Spasticity with resulting shortening of the range of motion leads to contracture which is an obvious handicap in utilizing a limb. The extremity immobilized by spasticity and contracture becomes a dead weight which interferes with the mobility of the rest of the body and is much more disabling than one which, in spite of loss of voluntary function, still retains some flexibility.

Spasticity also interferes with practical recovery of voluntary motion of the antagonists. Many patients demonstrate spastic extensors of the knee and are unable to flex the knee against the spasticity. When these muscles are relaxed, voluntary knee flexor power manifests itself. In our own work, it has been possible, in selected cases, to improve such initial slight voluntary power by relaxation of the spasticity and by utilizing facilitation technics in physical therapy. Thus, spasticity is a deterrent to the full utilization of residual motor capacity.

It is incorrect to assume that spasticity is always harmful. Often extensors of the knee maintained in contraction by spasticity help keep a patient erect when relaxation of these same muscles, without sufficient voluntary power, results in collapse of the knees on weight bearing. Spasticity may also be of value in facilitating voluntary power in the spastic muscles themselves. Twitchell¹⁰ points

out that the first voluntary movements to appear following hemiplegia are themselves facilitated reflexes. He believes that the problem at this stage, is not so much to abolish the spastic reaction as to harness its diffuse hyperactivity.

A number of therapeutic procedures have been utilized in dealing with spasticity. The surgical approach has been employed frequently. Foerster¹¹ recommended posterior root rhizotomy. Others have sectioned the anterior roots or performed neurectomies. Putnam¹² attempted to destroy some of the descending facilitatory pathways by cutting the corticospinal tract. Bucy¹³ found that interruption of the vestibulospinal tracts did not prevent spasticity, and Hyndman¹⁴ noted that partial interruption of reticulo-spinal connections caused some reduction in spasticity. The latter procedure proved hazardous because descending connections from the reticular formation were distributed so diffusely that their complete interruption might sever other essential paths.

The use of drugs in relieving spasticity has received some study. Kabat¹⁵ employed neostigmine and attributed its effect to action on the internuncial neurons. Others suggested the use of agents which block the neuromuscular junction, such as curare, or curare-like substances¹⁶. Most recently, mephenesin has been employed with some success¹⁷. The exact nature of its effect is not known, but its action also appears to be primarily on the internuncial neurons. Polysynaptic neural circuits are depressed by mephenesin more than are monosynaptic¹⁸.

The physiological approach has received the least attention of any in the management of spasticity. Mild applications of heat have been employed by a number of workers¹⁹ in the form of hot packs, paraffin, and infra-red irradiation. LaJoie and Gersten²⁰ could find no value in hot packs or paraffin baths, but found some benefit from infra-red when employed close to the involved muscle.

Bobath and Bobath²¹ employed tonic-neck and other postural reflexes in the treatment of spasticity. These authors suggest that relearning plays a role in

the gradual relaxation of spasticity which follows use of their methods.

Passive stretching also has been used. It is probably the most commonly employed procedure for treating spasticity, although it is not certain whether the intent of the stretching is primarily to prevent contracture or to relax the spasticity, since the two go hand in hand.

As a result of our studies on the dynamics of voluntary movement in man, it was found necessary to reassess the significance of reciprocal innervation. It was concluded that in normal voluntary motion, there is at present, insufficient evidence that reciprocal innervation plays the role in the coordination of the contraction of antagonist muscles which is assumed for it by most current thinking in kinesiology^{22,23}. Ralston and Libet²⁴ later agreed with this evaluation. However, there is no doubt that reciprocal innervation is of importance in reflex movement, especially in spasticity and decerebrate rigidity. In the human, for example, electrical stimulation of muscles antagonistic to those with spasticity brought about relaxation of the spasticity. Enlargement of our original observation has been made and some objective measurements of this relaxation are herewith presented. In this paper, evidence for the effect of a number of other procedures on the inhibition of spasticity is also stated.

Method

There are a number of ways in which spasticity may be measured objectively. These include electromyographic^{25,26} and mechanical procedures^{26,27}. The latter employ devices which measure either the acceleration of the extremity following application of an external force or the resistance offered to passive movement while the movement is in progress. At best, all methods give only an approximation of the degree of spasticity, since variations are present in different parts of the range. On the other hand, a significant change in any of the measurements reflects a general decrease in spasticity. In our experiments, goniometric measurements were utilized of the complete

range of passive movement based on the fact that in spasticity there is a marked limitation of the range of movement. When relaxation occurs, a measurable increase in range results; simultaneously, there is a decrease as well in the resistance to initiating the passive movement; there is also a decrease in the resistance within the range. Consequently, measurements of the total range indicate alterations in initiation and progression resistance as well.

Preliminary to this study, the statistical significance of the measurements employed were evaluated, recognizing the error inherent in the use of the goniometer. It was found that with one trained person constantly doing the actual

have been evaluated statistically, and where so stated, found to be significant.

Three different passive motions (fig. 1) are reported for each test. The first, straight leg raising (SLR), is measured with the patient supine on a hard surface treatment table. With the knee extended, the leg is raised in flexion at the hip until the end of the range is obtained. This is then measured with a goniometer, one arm of which is placed on the midline of the lateral surface of the thigh, the other on the midline of the lateral surface of the trunk. The second motion measured consists of the angle formed by the flexed hip and the trunk, with the knee in maximum flexion (HKF). The goniometer is placed in the same position as for straight leg raising.

The third passive motion measured is abduction (ABD). The patient is supine on the treatment table with legs extended, hips neutral as to rotation. Each leg is then abducted from the midline of the trunk. The axis of the goniometer is placed on the anterior superior iliac spine. One arm is placed on the midline of the anterior thigh while the other is held parallel to the midline of the anterior trunk. Patients with a variety of diseases were employed for studies on spasticity. Numerous observations were made in each condition, and what is presented here is but a small sample of the accumulated data. Normal individuals, selected from the personnel of the Kabat-Kaiser Institute, were employed as controls to check the accuracy of the goniometric measurements. Descriptive details of each procedure will be given with the data for that particular method.

Electrical Stimulation

A previous report states that faradic stimulation of antagonists brings about relaxation of spasticity²⁰. This was attributed to reciprocal innervation. Sherrington demonstrated the same phenomenon in animals with decerebrate rigidity. Duchenne²¹, the father of electrotherapy, observed it on an empirical basis in patients about seventy-five years ago. More recently, stimulation of the

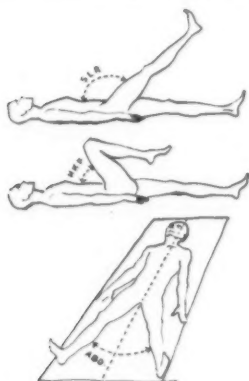


Fig. 1—Diagrammatic representation of ranges of movement employed in measuring alterations in spasticity. SLR stands for straight leg raising; HKF for hip, knee flexion, and ABD for abduction.

measuring, and another moving the extremity, there was less error than might be expected. However, even then, measurements of any one movement at any single joint had considerable error. Fortunately, the effect of the relaxation technics extended to adjacent muscles and joints which made it possible for us to measure more than one movement for each procedure tested. Measurement of three different movements such as were employed in our evaluations are statistically significant if they all vary in any one direction. The details of the goniometric studies on the normal will be published later. Data presented here

spastic muscle itself⁸⁰ has been reported to relieve spasticity and the beneficial effect has been attributed to fatigue.

Although it was originally stated that maximum stimulation of the motor point brought about the beneficial effect, recent observations indicate that other points on the surface of the antagonist muscles may invoke the same response, possibly through direct stimulation of afferent nerves. This also is in accord with Sherrington's experiments on decerebrate rigidity.

Relaxation may not occur instantaneously, but may develop over a space of seconds after application of the electrode. Maximum relaxation results when the limb is carried passively through the entire range of motion during the inhibition of spasticity by electrical stimulation. This may be due to a summating effect of the inhibition accompanying passive stretch and that resulting from electrical stimulation.

Table 1.—Effect of Electrical Stimulation on Spasticity

PATIENT E. H.		Diagnosis Multiple Sclerosis			
LEFT LEG		RIGHT LEG			
	Before	After	Before	After	
SLR	47°*	59°	65°	65°	
HKF	104°	119°	115°	128°	
ABD	13°	18°	6°	14°	

*All numbers in this and subsequent tables indicate the extent of the range of movement in terms of degree of the angle as measured by a goniometer. The term SLR indicates Straight Leg Raising. HKF is an abbreviation for hip-knee flexion. ABD is for abduction.

Table 2.—Effect of Electrical Stimulation on Spasticity

PATIENT B. V.		Diagnosis Multiple Sclerosis				
		4/2		4/3		4/9
		Before	After	Before	After	Before
Left Leg	SLR	61°	78°	58°	79°	69°
	HKF	105°	128°	115°	121°	117°
	ABD	25°	27°	24°	32°	22°
Right Leg	SLR	60°	81°	66°	81°	70°
	HKF	90°	130°	119°	128°	123°
	ABD	24°	29°	27°	31°	22°

Electrical stimulation daily from 4/2 to 4/9—data for 4/9 is measurement before stimulation and shows improvement over the first measurements on 4/2. This shows cumulative effect of relaxation.

Relaxation which follows electrical stimulation is shown in the data presented in table 1. In stimulating over a per-

iod of time, it may be observed that the effect is cumulative since the measurements on 4/9, before relaxation, show an improvement over the initial measurements on 4/2 (table 2). The persistence of relaxation is also indicated in table 3.

Table 3.—Effect of Electrical Stimulation on Spasticity

PATIENT B. H.		Diagnosis Multiple Sclerosis			
RIGHT LEG		4/15		4/16	
		Before	After	Before	After
SLR	30°	60°	51°	68°	
HKF	75°	119°	102°	123°	
ABD	17°	22°	19°	24°	

Stimulation on consecutive days results in marked relaxation which persists till following day.

The Effect of Cold on Spasticity

Following the experiments with electrical stimulation, work was done on what was at that time an unrelated problem; the effect on multiple sclerosis of immersion in hot and cold water was studied. This was done at the suggestion of one of our patients who had observed beneficial effects from cold baths in this disease.

Patients with multiple sclerosis respond unfavorably to heat. Guthrie⁸¹ reported that following partial or total body heating, there was increased weakness as well as decreased visual acuity. In a series of our patients, it was possible to confirm this observation. Individuals with multiple sclerosis placed up to the waist in a tub of hot water (105 F.) responded poorly; symptoms included increased muscular weakness and, in one case, even mental disorientation. The results of these experiments will be published later.

Other workers have assumed that cold would have a similar bad effect. Chilling has been regarded as one of the common precipitating factors in this disease; they report from their own experiences that patients feel exposure to cold increases the severity of their symptoms. It was, therefore, a surprise to discover that immersion in cold water (50 F.) up to the waist had no adverse effects. In fact, many patients benefited from the procedure. In trying to explain this, it

was learned that improvement in spasticity could account for some of the observed amelioration of symptoms. Functionally and by objective measurements, patients subjected to this procedure showed improvement in locomotion and in other test procedures. In later experiments on the effect of cold limited to a single extremity, it was found that immersion of the spastic hand, and similarly, immersion of the foot (table 4) brought about relaxation of spasticity in the knee and hip as well.

Table 4.—Effect of Cold on Spasticity

PATIENT R. V.	Diagnosis Multiple Sclerosis	
	Before	After Right Foot in Cold
RIGHT FOOT		
SLR	33°	45°
HKF	55°	82°
ABD	12°	21°
LEFT FOOT		
SLR	31°	46°
HKF	50°	46°
ABD	13°	18°

Ankle and foot in water 50 F. for five minutes. This shows effect, on left leg as well as on right leg, of cold applied to right foot and ankle.

This has been an interesting off-shoot of our experiments on spasticity—the observation that spasticity cannot be thought of as occurring in isolated groups of muscles. Rather, spasticity must be considered in terms of the entire extremity. Relaxation at any one point affects the musculature of the entire limb and even the musculature of the contralateral limb. Movement cannot be thought of in terms of isolated muscles, but rather in terms of total patterns of movement^{28,32}. Almost as a corollary to this, it is felt that spasticity must also be thought of in terms of the total pattern of both spasticity and interrelated movement.

Two factors may account for the effect of cold on spasticity: one is the direct action of cold on spasticity through its influence on the sensory receptors. Another is the role of cold in initiating the withdrawal reflex on immersion of a limb in cold water. Initial exposure to cold may induce marked flexor spasm, which accounts for the clinical impres-

sion that patients are worse after exposure. However, after a short period of time in the ice water, the flexor spasm ceases, and immediately following this, relaxation of the spastic muscles becomes evident.

The action of cold on the hand of the spastic hemiplegic is especially marked. The flexor spasticity yields rapidly and completely in the wrist and fingers. In the upper extremity, following immersion of only the hand and wrist, relaxation occurs in the shoulder, but spasticity may increase slightly in the elbow. Be-

Table 5.—Effect of Heat on Spasticity

PATIENT E. H.	Diagnosis Multiple Sclerosis			
	Before	After	Before	After
LEFT LEG				
SLR	51°	56°	61°	56°
HKF	114°	94°	114°	97°
ABD	21°	12°	13°	12°

Both feet and ankles in hot water (105 F.). Increased spasticity results.

cause of the danger of the pressor effect, this procedure may be contraindicated in hemiplegia associated with arteriosclerosis or hypertension. It is, however, of value in traumatic hemiplegia. The peculiar action of the cold in failing to relax the elbow shows the complexity of the problem, and indicates that study of each individual case is necessary before the specific form of relaxation therapy is decided upon.

In spite of numerous reports that heat is beneficial in spasticity, immersion of the foot and ankle in hot water (105 F. for five minutes) increases rather than decreases spasticity of the lower extremity (table 5). We believe there is no contradiction between the reported beneficial effect of heat when applied directly to the spastic muscle and observation of the foregoing results. Heat as a form of therapy in spasticity, just as much as cold, requires specific indications as well as precise applications.

The Effect of Passive Stretch and Exercise on Spasticity

Passive stretch in the form of the lengthening reaction quite obviously brings about relaxation of spasticity. This can be demonstrated, for example, in

any patient with tightness in the extensors of the knee during the initial flexion of the knee. However, the effect of passive stretch at the end of the range, which is intended primarily to increase the total range of movement, is less definite. Our experience indicates that passive stretch utilizing straight movements of the extremities is not as effective as

Table 6.—Effect of Passive Stretch on Spasticity

PATIENT E. H.		Diagnosis Multiple Sclerosis			
RIGHT LEG		LEFT LEG			
	Before	After	Before	After	
SLR	55°	44°	45°	46°	
HKF	94°	112°	93°	112°	
ABD	7°	10°	10°	11°	

Patients stretched in the same ranges as measured. Limb moved in straight movements.

passive stretch which permits the limb to be moved through a range simulating normal patterns of movement³² (table 7). Table 6 shows the effect of stretching, utilizing straight movements of the lower extremity. Improvement is questionable.

Table 7.—Effect of Passive Stretch on Spasticity

PATIENT F. D.		Diagnosis Multiple Sclerosis			
LEFT LEG		RIGHT LEG			
	Before	After	Before	After	
SLR	40°	55°	40°	58°	
HKF	55°	110°	110°	123°	
ABD	7°	10°	6°	14°	

Patient stretched in the same ranges measured. Limbs moved in diagonal rotary patterned movements.

The Effect of the Von Bechterew Reflex on Spasticity

As an example of a number of reflexes which influence spasticity, table 9 illustrates the effect of the Von Bechterew reflex induced by plantar flexion at the metacarpophalangeal joint of the big toe. The mass flexion spasm which results produces relaxation in the homolateral leg as well as in the opposite lower extremity. A crossed extension reflex has been observed in certain patients. Relaxation in one leg is accompanied by an increase in extensor spasticity in the opposite leg.

Table 8.—Effect of Resistive Exercise on Spasticity

PATIENT F. D.		Diagnosis Multiple Sclerosis			
LEFT LEG		RIGHT LEG			
	Before	After	Before	After	
SLR	35°	85°	57°	78°	
HKF	55°	125°	108°	132°	
ABD	11°	14°	9°	17°	

Exercise of the lower extremities using diagonal rotary patterns of movement against manual resistance.

Table 9.—Effect of Von Bechterew Reflex on Spasticity

PATIENT B. V.		Diagnosis Multiple Sclerosis			
		Before	After Stimulation of Left Big Toe	After Stimulation of Right Big Toe	
RIGHT LEG:					
SLR	23°	45°	55°		
HKF	35°	68°	90°		
ABD	9°	14°	16°		
LEFT LEG:					
SLR	29°	47°	60°		
HKF	40°	92°	92°		
ABD	13°	20°	20°		

Discussion

The explanation for spasticity lies not in the increased response of the stretch reflex, but rather in the exaggeration of the postural reflexes. Since all reflexes, including the well-known "knee jerk," are subject to modification by a variety of factors, it is not unexpected that exaggerated postural reflexes as found in spasticity, are also influenced quantitatively by physiological conditions. If we were to attempt a summary to apply to all the physiological procedures for relaxing spasticity discussed in this paper, it could be stated that the relaxation occurs through the facilitation of reflex inhibition. Even volitional movement relaxes, probably not through the element of volition, but rather because of many reflex aspects of the movement itself; movement although labeled volitional, certainly is largely reflex in nature. The mere desire to relax, or the willingness to relax, does not result in any significant amelioration of spasticity.

In evaluating the effect of various procedures on spasticity, it must be taken into consideration that the site of the

lesion in each patient will influence the degree of spasticity and the extent of the relaxation which may occur following the use of these technics. One other variable which is of great importance is the distribution of the spasticity in each patient, which will determine again the choice of technics.

The procedures studied here will not cure spasticity. The relaxation which occurs persists for varying periods of time, depending on whether there is any alteration in functional movement of the patient following relaxation. In those in whom restoration of voluntary motor function can be achieved, the relaxation assists in attaining this goal more rapidly, since spasticity may at times be a deterrent to slight voluntary motion. In other patients with static or progressively deteriorating lesions, the relaxation of spasticity will persist only after treatment is discontinued, if neuromuscular re-education succeeds in achieving a change in functional movement either through facilitation of pre-existing motor potentialities or through mechanical facilitation of movement. If a patient has been totally incapacitated, and relaxation permits ambulation, even with the aid of devices, improvement in spasticity will persist as the result of the new dynamic balance between movement and spasticity.

In spite of the fact that there are cumulative effects from repeated relaxation, if the status of the patient in terms of functional movement does not change, relaxation will not persist after treatment is discontinued. However, if the relaxation technic is applied daily over an extended period, the reduction in spasticity will be beneficial in decreasing the disability.

The choice of method will depend on many factors, and for the moment the empirical approach is the most satisfactory. Where voluntary power permits, active resistive exercise (table 8) is the procedure of choice for relaxation since it helps restore function as well. Of the other procedures studied, electrical stimulation is the most effective since it gives the most complete relaxation, and can be used with skill to give relaxation ex-

actly where it is needed. On the basis of our present observations, cold has significant power of relaxation in some patients. The observations in this paper are of fundamental importance in our understanding of spasticity, and may form the nucleus for a more successful approach to treatment of this condition.

Summary

A number of physiological factors relax spasticity. These include active resistive exercise, cold hydrotherapy, electrical stimulation of antagonists, passive stretch in diagonal rotational patterns and the Von Bechterew reflex. These may be utilized in the therapy of spasticity. The choice of procedure will depend on the nature of the lesion as well as the muscular distribution of the spasticity.

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The Psychiatric Sheltered Workshop in Rehabilitation of the Mentally Ill

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Interest in the rehabilitation of the physically handicapped is now at its peak. Much has been done for every type of physical disability from an automatic artificial finger to elaborate vocational training shops. Employment of disabled persons is even considered at times an economic asset. The mentally ill are not so fortunate. No prosthetic device has yet been discovered to substitute for the function of the human mind. Industry has been refusing to open its doors to the post-psychotic individuals, and while the "Handbook on Sheltered Workshops"¹ lists scores of such institutions there is not a single one of them that has been organized to help primarily the psychiatric patient. This lack of psychiatric sheltered workshops—the missing vocational bridge which would have allowed the convalescing mental patient to make a gradual transition from the protective hospital environment to a hostile, competitive society—is a most prominent gap in the rehabilitation of the mentally ill. It is the purpose of this paper to indicate the need for such workshops and to suggest a plan for their organization.

By a sheltered workshop is meant *a medically supervised place of remunerative employment where the physically or mentally handicapped individual, living in the community, is given an opportunity to work in accordance with his physical and emotional resources.* It is also desirable for sheltered workshops to provide vocational training. The psychiat-

ric sheltered workshop is one that is primarily geared to take care of psychiatric patients. With one possible exception, the United Vocational and Employment Service in Pittsburgh², as far as is known³, there does not exist a formally organized sheltered workshop answering the foregoing description and serving a substantial number of the mentally ill in the United States or elsewhere.

The Need for a Psychiatric Sheltered Workshop

Statistics vary, but according to conservative estimates, one-fifth of all discharged mental patients are readmitted to psychiatric hospitals within two years⁴. There are between fifty and one hundred thousand readmissions yearly! The reasons for readmissions can be broken down into three categories: first, reactivation of the mental condition per se; second, unsatisfactory social environment; and third, inadequate vocational preparedness. There is such interaction among all these that it is frequently impossible to distinguish between cause and effect. In this paper we are chiefly concerned with the vocational problem. The influence of vocational preparedness upon the mental condition of the patient has not been sufficiently appreciated. Vocational adjustment plays an important role in the patient's adaptation in the community. In the writer's opinion—based upon experience with psychiatric patients—inadequate vocational preparedness ("preparedness" is used here in a broad sense, much more than mere prevocational training) is partly responsible for the large number of patients readmitted to our mental hospitals. The average convalescing pa-

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tient discharged from the hospital feels, and justifiably so, that he cannot as yet enter a situation where he is expected to conform to the "all or none" laws prevailing relative to job requirements. The patient becomes apprehensive about not being able to put in eight hours of work, as expected, or otherwise to compete with his fellow workers. He therefore procrastinates in seeking employment. This creates a vicious social circle which eventually contributes towards aggravation of mental symptoms and frequently necessitates readmission to the hospital. Other patients with sufficient courage to obtain a position are not able to keep up with the usual demands. This leads to change of jobs, and anxiety, often resulting in eventual return to the hospital. This, of course, is not the mechanism behind all or most recidivism, but it operates, no doubt, in a large number of cases.

In the attempt to focus attention on the present gap in the rehabilitation of the mentally ill, the problem of readmissions is cited. As important as it is, the need for psychiatric sheltered workshops is by no means however, limited to that one facet. A similar consideration operates in some of the patients who have become institutionalized and are reluctant to leave the hospital. They fear the competitive situation facing them in the community. Anxiety in relation to the unpredictability of vocational adjustment in such a community plays an important role in the negative attitude toward discharge. With availability of sheltered workshops for these patients, the knowledge that the vocational transition need not be abrupt, but through a gradual and secure process of the workshops, may be the determining factor in the patient's decision to accept the challenge of community life.

There is another large group of patients many of whom are in urgent need of such workshops. This is the group in which adequate sheltered vocational facilities could assist in *avoiding* hospitalization. These are the mentally ill who have been able for some time mostly with the support of private psychiatric

help or outpatient mental hygiene clinics to make a minimal adjustment in the community. However, as their symptoms intensify, the first serious result is the inability to perform on their jobs to the extent of satisfying the usual industrial demands not only qualitatively but also quantitatively. The sequential repercussions and their effect upon the patient's mental condition are a matter of foregone conclusion. A number of these patients could avoid the need for hospitalization if they were provided with temporary sheltered workshop conditions which would bring some economic security and also offer reassurance of being able to contribute to society.

Because of the availability of more effective methods of treating the mentally ill, particularly psychosurgery, and with expanded scope of social service functions, a greater number of the so-called "hopeless" psychiatric patients are being discharged now, more than ever before. One must not infer that all of these patients have been "rehabilitated." These are the more fortunate ones, of the many institutionalized patients, whom loving parents and/or sacrificing wives are willing to have at home as nonearning dependents. Most of these men and women can never hope to be normally employed in the community. And yet under proper supervision and in a sheltered environment they can produce and frequently earn enough to be self-supporting.

Some individuals whether ever hospitalized or not were unfortunate enough to develop incipient symptoms of mental illness early in life, before they were able to acquire work habits as wage earners. Again, the "all or none" laws of industry did not allow these patients to produce according to their capacity. The psychiatric sheltered workshop with adequate training facilities is, perhaps, the solution to their problems. Many of these individuals probably have potentialities of readjustment in the community as full fledged contributing citizens. The same may be true of other psychiatric patients who, as a result of training while earning (a financial in-

centive⁵) may become more successful vocationally than they were prior to their illness.

Other Considerations

Thus far, the benefit of psychiatric sheltered workshops as pertaining to the patients themselves, and particularly to their mental health has been considered. There are also other considerations. The first that might be cited is the effect upon the immediate families of these patients. Besides the financial return, which is of considerable importance in itself, there is the satisfaction of the members of the family where the patient carries the honor of being a wage earner and has regular employment hours.

Another consideration is that of "educating the employer" so that he will not be prejudiced against hiring a post-psychotic patient. It is always embarrassing to face the convalescing patient's question "what shall I tell my employer?" The patient feels, and he is quite right, that a history of hospitalization in a mental hospital would more or less automatically disqualify him from obtaining a job. The conflict created added to the patient's anxiety. A great deal is being done by vocational services⁶ to make this problem less acute. Although, as Dr. Rennie stated,⁷ "... recovery from mental illness rarely leaves a person impaired for effective work and some psychiatrically handicapped individuals are particularly good workers because of their character traits of conscientiousness and perfectionism," still many employers hesitate to take the economic risk. Here the sheltered workshop can act as a training employment agency, whose graduates qualify after meeting necessary requirements. Furthermore after the industrialists absorb a certain number of these patients, their opinion about psychiatric patients as prospective employees will be gradually modified. In this manner the workshop will assist in the education of the community. It is to be noted that some hospitals are already contributing to this process by publicizing the fact that they

are successfully employing many of their ex-patients⁸.

The nation's economy is always of direct concern to each of us. There are almost three quarters of a million hospitalized mental patients and many others in the community who are presently non-contributing. One of the results of the establishment of sheltered workshops will be an additional source of manpower hitherto unexploited.

The Psychiatrists' Point of View

The question may be raised: how do psychiatrists feel about this problem, and is it not predominantly theirs? Having the privilege of serving on the Medical Rehabilitation Committee of the American Psychiatric Association, the writer has been able to observe the psychiatrists' reaction to this question. I am very happy to report that the suggestion to study the problem of psychiatric sheltered workshops as a part of the rehabilitation of the mentally ill through combined efforts of psychiatry and psychology was received enthusiastically not only by the committee itself, but also by the Council of the American Psychiatric Association. It is also significant that as an indirect result of the discussions involving sheltered workshops, a resolution was passed by the Council of the American Psychiatric Association to arrange a formal liaison between that organization and the American Congress of Physical Medicine and Rehabilitation to study problems common to both specialties.

It is apparent that psychiatrists feel that rehabilitation problems of the mentally ill are to be solved by a combined effort of psychiatry and physical medicine and rehabilitation. The broad scope of the training of psychiatrists including its vocational aspects, places them in a position to be of great assistance to their psychiatric colleagues in rehabilitation of the mentally ill.

The Organization

The primary role of the psychiatric sheltered workshop is to serve as a transitional vocational bridge between the hos-

pital and the community. The establishment of psychiatric sheltered workshops is viewed as a project of a triple partnership: psychiatry, physical medicine and rehabilitation, and industry. The last named would serve not only as an outlet for the manufactured products or services, but should also assist in financial matters, equipment, and act in an advisory capacity. More important, it should provide normal employment for the graduates of the sheltered workshops.

The sheltered workshop should also be able to provide vocational counselling and on the job training facilities. A good organization would be one containing, in addition to the vocational program and medical re-evaluation follow-ups, a sustaining therapeutic clinic where the patient could obtain, if necessary, supportive psychiatric and/or psychiatric treatment while he is on the job. Ideally the first phase of the patient's assignment would be one where this supportive assistance is available. The second phase would consist of working under conditions which he would meet in the community and preferably among non-psychiatric members.

Such a program of sheltered workshops is not unrealistic. As Dr. Rusk stated, "It requires money and leadership." This country is rich in both. It has done much for the physically handicapped. Every phase of industrial rehabilitation is now available to them*. The mental patient, because of certain public prejudices, is even in greater need of a gradual, complete process of readaptation in society. To many such patients this process is unavailable because of lack of transitional vocational facilities. At the present time one of the most important needs in the rehabilitation of the mentally ill is the establishment of psychiatric sheltered workshops.

Summary and Conclusions

Although every phase of vocational rehabilitation is now available to the physically handicapped, there exists an important hiatus in the rehabilitation of the mentally ill—the absence of the psychiatric sheltered workshop.

The various needs for such a workshop are described and an organizational plan suggested.

It is hoped that recognition of these needs will lead to the establishment of psychiatric sheltered workshops.

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Understanding Aphasia

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Aphasia is a disorder that affects the patient's total language function because of a disturbance of the integrating capacity of the cortex and related structures. An understanding of aphasia cannot be gained by consideration of any single aspect of language alone. Disordered speech represents only one facet of this extremely complex group of pathological entities. A lesion situated anywhere within the so-called speech centers is likely to effect widespread repercussions throughout the central nervous system. An attempt will be made to concentrate within this paper a concise analysis of the diverse anatomical, physiological and psychological data relevant to an understanding of aphasia.

A language function disturbance which results from a lesion of cortical tissue or associated intra-cerebral pathways broadly designates the condition known as aphasia. The meaning of this term excludes disturbances of speech associated with general mental deficiency, loss of function of the sense organs per se, paresis of the writing musculature and lesions of speech musculature innervation or of the speech mechanism itself. Various investigators and authorities have adopted terminology which may be somewhat confusing to the uninitiated observer. Current classifications of language function disturbances are included in the three broad categories of aphasia manifested by aberrations within, (a) the receptive or sensory sphere, (b) the emissive, motor or expressive neural mechanism and, (c) disturbances of formulation. The latter have been designated also as anomic, conceptual, amnesic, nominal, semantic,

and intrinsic or elaboration aphasia. It becomes apparent that the connotations of the last group of terms, though similar, are far from identical. Additional terms have been adopted to denote those language disturbances which do not fall into any one of these categories, such as expressive-receptive, control, transcortical, motor-sensory and mixed types. An understanding of aphasia may be facilitated by an extensive comprehension of the terminology associated with these forms of language disorders; however, we must always be orientated to the fact that the "real" pathology lies within non-verbal, silent levels of higher order abstraction processes which are not so discretely categorized.

It is extremely doubtful whether or not such a thing as pure motor, or pure sensory, aphasia exists. It is more certain that a more obvious speech or comprehension defect has repercussions throughout the total personality structure of the individual and certainly affects the whole segment of the communicating social structure of which the patient was, or is, a part. Whenever language processes break down, the condition which arises is quite intricate because of the complexity of language itself. The close functional interrelationships of the various aspects of language in the course of its development and the extent to which language processes have permeated conscious cerebration must be considered. Indeed upon introspection one has the false impression that thinking "without words" comprises a small fraction of our daily conscious cerebral activity. This is especially so in the field of social communication where information is transmitted almost entirely with the written or spoken word.

Froeschels¹ has stated that the concept of aphasia must be a dual one; that is,

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preciseness is necessary in understanding the localization of the anatomical lesion, whereas the Gestalt approach is necessary if insight is to be gained in understanding the mechanism of the totality of interrelated functioning. This approach is vital in order to see both the parts and the whole clearly and simultaneously in their mutual relationships. It is well known that certain areas subserve particular language functions more than others and that the entire brain is needed for normal linguistic activity.

Psychological Aspects

The psychology of the handicapped is one of frustration and insecurity. Berger² has stated that the psychological problems have their origin in the evaluation which the individual places upon his own life experiences, his bodily condition and upon the reactions of others toward him. Man cannot live a successful and happy life without the ability to adjust himself to his physical and social environment.

Much detailed discussion of case material on the aphasic individual is available elsewhere in the literature dealing with explicit data on the psychometric evaluation of such brain-injured individuals. Results of these examinations disclose that conventional test material may fail to reveal important information regarding, for example, the self-concept of the adult aphasic patient. The post-traumatic personality structure may reflect extensive alteration in cerebral functions which are concealed beyond the more obvious aphasic defect. It is important that psychological evaluation be serialized and that observations be made at sufficiently regular and long intervals following the onset of symptoms or trauma. The period of spontaneous recovery is generally taken to be approximately six months³. Thereafter recovery may be expected to some degree for a period extending into years. However, aphasia training during the first few months produces the more evident results.

There are features which more or less characterize the aphasic patient's be-

havior but these are found in many post-traumatic states. They are as important as the language function disturbances and should be evaluated as carefully as the more bizarre peculiarities of speech and comprehension. Often observed are lack of concentration and extreme distractability. The attention span may be not much longer than that of the preschool child. Increased irritability and fatigue are such that training and examination periods should be designed accordingly. In contrast to this, we may find in other respects a certain inflexibility, or inability to shift, from one field of attention to another. This is more obvious in the phenomenon of perseveration where there is involuntary persistence of one reply, or one idea, in response to various questions. Because insight is usually retained, except in the more complex emissive and receptive types, marked feelings of inadequacy with resultant social withdrawal and seclusiveness may result. Where this insight is lost and the normal feedback mechanisms by which speech is monitored are defective, there may be volubility, externalization of behavior and a lack of introspection and self-criticism coupled with euphoria. These symptoms are seen in other neurological disturbances as well.

Halstead⁴ has indicated that in a normally functioning brain there appears to be a factor which operates to counterbalance or regulate the effective forces and thus frees the growth principle of the ego for further ego differentiation. This has been considered by some to reside within the frontal lobes but has been seen also in association with lesions in or about the language centers of the major hemispheres. The loss of this factor is manifested as a reduced ability to inhibit internal emotional forces which disturb the action of the intellect. Behavior deviations which appear as impulsiveness or regressive and infantile mannerisms characterize many aphasics. The so-called catastrophic reactions are described, in which tremendous outbursts of affective pressure, appearing as rage, profanity or weeping, are precipitated

by situations not ordinarily frustrating. Anxiety and tension are features attendant upon continued speech impulse and language frustrations of the individual with relatively intact insight. On the other hand the patient may be beset with a more or less continued attitude of perplexity. He may display a decreased ability to plan future action and to form higher abstract ideas by generalization and a conceptual type of thinking. Constriction of thought and interest with so-called psychomotor retardation and reduced initiative are commonly observed.

Superimposed upon these sundry aberrations in the psychology of the aphasic there exists a loss of memory for recent and the immediate pre-traumatic events to a greater or lesser degree. Those memories occurring from earlier days and with some deeper emotional significance are likely to be better retained. Because of this latter effect on memory, the aphasic patient must be evaluated comprehensively for all possible relevant data of his past history. This history should include a pre-aphasic personality inventory, the role and relative importance of language symbolism in the individual's previous livelihood, his extent of socialization and some estimation of his goals, both vocational and avocational. Such data are invaluable in understanding the patient's reaction to his language deficit, which is conditioned further by the extent to which his insight has been preserved. It is well recognized that many aphasics are not aware of their disability because of a disturbance in their self-critical faculties. This may be analogous to the disturbance of body scheme exhibited by the hemiplegic who may react as if his paretic limbs do not belong to him. In others this self-critical factor appears to be increased, with resultant intensification of frustration of speech impulse and drive. Repeated failures may seriously detract from further effort. Schuell⁸ points out that the responses of patients vary inversely with the level of anxiety.

Much has been written in describing

the personality structure of the aphasic. Comparisons have been attempted between groups of patients exhibiting aphasic defects and the brain injured who do not. No description nor comparison characterizes any individual aphasic patient nor even, to any degree of accuracy, any phase of his progress. Likewise any attempt to compare the intellectual capacity of the aphasic brain-injured to persons with other types of cerebral pathology becomes elementalistic. Intelligence is generally considered as a total cerebral function. Evaluation of intelligence should be concerned more with its qualitative rather than quantitative aspects.

Physiological Aspects

Few specific data are available from experimental research concerning the physiology of the cortical areas which subserve language comprehension, formulation or expression. These areas respond to direct electrical stimulation, as done by Penfield and Rasmussen,⁹ by either arrest of speech or provocation of simple vocalization. However, such has been observed on stimulation of areas which are not usually considered as speech areas. The longitudinal fissure, adjacent to the Rolandic fissure in the frontal cortex and in the lower one-third of the pre- and post-central gyri are examples of these areas. Aphasic arrest, or arrest of speech and counting, was observed with stimulation of areas corresponding to Broca's area, the temporal language formulation area, and in a region anterior to and encroaching upon the so-called eupractic center. During stimulation in the "aphasic arrest" areas, in addition to mere vocalization, hesitation, or complete speech arrest, the subject was observed to substitute words for ones he could not remember. This temporary confusion of words was similar to that which confronts a patient suffering from aphasia.

Anoxia may depress these language and other areas in the cortex. It has been observed that individuals at high altitudes, or suffering from mountain sickness, frequently use the wrong words or

are unable to recall the names of familiar objects. An excellent example of this is reported from the last Mt. Everest expedition by one of the climbers. He stated that he would have used his camera but while at the great altitude he could not recall for what it was used. Another who requested his ice-axe could think quite well of what he sought but could ask only for a "tramcar." Fatigue also may be considered as a form of anoxia to produce language changes. Function of these language areas is similarly affected by drugs and increased intracranial pressure and may be altered apparently by hypnosis.

According to the hypothesis of the cyberneticians⁷, feed-back and reverberating circuits play a role in readjustment and revisualization of spoken and written language symbols. In recent experiments a subject's conversation is momentarily delayed by recording and play-back electronic mechanisms. These then produce temporary, gross malfunctions of hesitancy, jargon-like speech and great affective disturbances apparently by "jamming up" the neural, feed-back mechanisms.

It is evident that similarly localized lesions with the same extent of pathology in the cerebrum of two individuals do not present the same symptoms. The variability in number and size, or even total absence, of cerebral cells without apparent behavior difference precludes regularity and precision of anatomical arrangement. Neuron activity in the cerebral cortex may be one of mass action;^{8,9} that is, any part may act like another. However, in man cortical areas have more specific function and this theory may not apply to all areas. Apparently the location of injury is much less important than the extent of tissue destruction⁹.

In general there is a dominance of one hemisphere, or portion thereof, with variability in individuals; ninety-four per cent are of left handedness with right handedness¹⁰. Occasionally all the major lobes may not be in the same hemisphere. These factors are apparently hereditary. Early in training there may be a shift of

handedness, but there is no shifting of brainedness entirely from one hemisphere to the other. Although handedness develops well by the end of the first year of life, brainedness does not develop definitely until age four or five years. After a lesion of the cerebrum the degree to which the minor side may function in language communication varies in each individual. Such factors as age, amount and character of training and, above all, the incentive of the individual control the function which the residual cerebral tissue may assume. The minor hemisphere fatigues easily on the initial assumption of function but develops endurance rather than specific capacity with training.

Much of what has been assumed regarding the function of various areas is based upon observations of alterations in the comprehension and reproduction of language following pathological deficits such as infarction, abscess and traumatic loss of cerebral tissue. The deductions drawn subsequently are inferential only. Functions of the so-called speech areas are assigned on the basis of language behavior deficit, but as yet we are unable to observe functional relationships of intact portions of the cortex. A crude analogy has been drawn in the instance of the amputee whose gait disturbances are an attempt at readjustment to his locomotor disability. From analysis of these abnormal movements one cannot deduce that such simply represent the residual intact component movements employed in the normal gait¹¹.

Anatomical Aspects

Normal language function appears to be dependent upon the structural integrity of several fairly well-defined cortical areas and associational pathways. Although these structures appear bilaterally they are not equally developed nor symmetrical. Complementing this complex system are the primary receptive centers and the pyramidal system.

The areas which ultimately come to subserve understanding and formulation of language probably do so because of their proximity and structural relation-

ship to the primary auditory reception center, located in the superior transverse temporal gyrus chiefly in the floor of the lateral fissure, and the primary visual reception center, situated in the walls of the calcarine fissure and adjacent portions of the cuneus and lingual gyri. Likewise, with regard to the executive aspects of spoken or written language, the articulatory and phonetic centers for speaking and centers for control of finger, hand and arm movements for writing lay in close proximity to the precentral gyrus. The more important cortical areas concerned in the process of language function are¹⁰: 1) the angular gyrus; 2) the area of Wernicke; 3) the temporal language formulation area; 4) the area of Broca, and 5) the frontal writing center of Exner. Other named areas of lesser known function in aphasia are the temporal musical center of Heschl, the supramarginal gyrus and the motor center for singing. The associational pathways are the temporal isthmus and the external capsule. The thalamus may be considered as a coordinating or integrating center in aphasia.

The basal ganglia, the insula and the internal capsule do not enter into the aphasia picture except indirectly. Lesions of the basal ganglia are associated only with disturbed articulation⁹, unless the external capsule is involved. Likewise lesions of the insula lead to an aphasic condition only if the external capsule is injured. If the anterior limb of the internal capsule is involved, there may be associated dysarthria or anarthria with the interruption of the pathways from the precentral gyrus to the pons and medulla. These corticobulbar pathways control the muscles of phonation and articulation.

Lesions of the angular gyrus result in a disturbance of interpretation, recognition and revisualization of visual symbols, or the visual aspects of language. This area is located behind the posterior end of the middle temporal gyrus in the inferior parietal lobe anterior and adjacent to the peristriate area. Normally only the major side is functional. There are associational and commissural pathways

with the striate and peristriate areas, the language formulation area, area of Broca, the frontal writing center of Exner and the area of Wernicke. Because of the close association in learning language of the visual and auditory stimuli the relationship to the major area of Wernicke is of primary importance. Likewise the function of the angular gyrus is directly related to the functional capacity of the major peristriate area. Thus similar aphasic aberrations, as seen associated with lesions of the angular gyrus, of disturbed visual aspects of language are observed with lesions of the peristriate area alone. Many of the reading or writing handicaps following angular gyrus lesions may depend upon the manner in which the individual has learned to read or write. One type of stimulus may be attended to, through thalamic control, much easier than another and assume a greater role in learning. Lesions of the pathways to the language formulation area and also to the expressive writing center and area of Broca may result in difficulty with speaking, writing and reading to varying degrees dependent on the location and extent of the lesion. These disturbances may simulate those in the angular gyrus itself.

The area of Wernicke lies in the lateral and posterior portion of the superior temporal gyrus. Lesion of this area may be associated with a deficit in the interpretation of spoken language. Although the symbols are heard they are meaningless. This pertains also to what the patient himself says, so that this aspect of the disturbance is referred to as involving reauditorization. Jargon speech is often a feature of damage to the area of Wernicke. Associational and commissural pathways are found to the angular gyrus, the transverse gyrus of Heschl, area of Broca, the frontal writing center of Exner and the language formulation area. The pathway to the minor area of Wernicke through the temporal isthmus and corpus callosum, or the anterior commissure, is of major importance when the major area of Wernicke is injured. The minor side then assumes a

primary function. The functional interdependence of Wernicke's area with the angular gyrus and the temporal language formulation area may produce an inability to comprehend the written word as well as the inability to speak coherently.

The language formulation area occupies a much larger section of the cortex than the other areas. It comprises the posterior portions of the superior, middle and inferior temporal gyri and maintains relationship with all other areas subserving some phase of language function. Pathology within this area results in an inability to synthesize words into coherent speech, or to use words, phrases or sentences with their proper syntax. This inability to recall names for persons or objects with intactness of auditory or visual conception has been termed as an anomia^{9,12}. As with deficits in the angular gyrus, and depending on the completeness of function assumed by the minor side, the patient may develop a jargon language called paraphasia.

The area of Broca is situated in the posterior, or opercular, part of the inferior frontal gyrus and is directly continuous with the cortex at the inferior, lateral pole of the precentral gyrus. Fibers from this area course into the internal capsule to form part of the corticobulbar tract as mentioned above. Associational pathways relate this area with the language formulation area, the area of Wernicke and the angular gyrus. Lesions of the area of Broca are associated with an inability to control coordination of speech musculature movements. Thus the patient is unable to speak even though he may understand written or spoken language and can formulate language from these stimuli.

The frontal writing center of Exner lies in the posterior part of the middle frontal gyrus in close proximity to both the area of Broca and the precentral gyrus. This writing center apparently bears a similar relationship to writing as the area of Broca does to speaking. As with the latter, this area is interdependent upon the same cortical areas and to a similar extent. A lesion of this area

is associated with an inability to control movements necessary to write, or agraphia. Because of this close relationship anatomically, both areas may be involved simultaneously. Thus, agraphia and Broca's aphasia often are coexistent.

The thalamus is connected to the language areas and performs the function of coordinating and integrating stimuli to these areas¹³. One stimulus is discriminated from another, or particular attention is focused on certain stimuli and others are partially or wholly blocked. Lesions of the thalamus may allow, among other symptoms, too many stimuli through to the cortex so that attention is diffuse and confused. On the contrary, too much attention may be focused on inappropriate stimuli or on certain stimuli with mental fixation, or perseveration, on a word, syllable or idea.

The external capsule consists of a narrow band of white matter interposed between the claustrum and the putamen. The posterior extremity lies within the temporal isthmus. In this capsule are associated fibers connecting the angular gyrus with the frontal writing area and the area of Broca, and connecting the language formulation area with the area of Broca. Thus this pathway comprises a very essential link in language function. Lesions are characterized by motor aphasia, agraphia, paraphasia and anomia similar to lesions affecting the primary language areas themselves.

The temporal isthmus is the white matter between the posterior horn of the lateral ventricle and the posterior portion of the insula. Many fibers necessary for the associational function of language areas lie in this pathway. Thalamo-cortical fibers relate the thalamus with temporal, parietal and occipital lobes. One cerebral hemisphere is related to the other by the corpus callosum and anterior commissure as part of the isthmian pathway. Both the auditory and optic radiations are part of the isthmus. The posterior extremity of the external capsule has been mentioned. Herein the language formulation area is connected to the area of Broca.

Lesions in the temporal isthmus explain why exact classifications of aphasia are impossible and how the minor hemisphere may function in language formulation in the absence of a portion of the major hemisphere normally associated with language. A lesion of the major thalamus affects attention to external stimuli; thus, the entire language function may be disturbed by interruption of the thalamo-cortical fibers. Lesions of the corpus callosum, or anterior commissure, involve the problem of brainedness and major and minor hemispheres. Although primary reception areas for visual and tactile stimuli appear to be activated equally bilaterally, the major auditory reception area has a slightly greater potentiality than the minor area. The stimuli from the minor gyrus of Heschl may be sufficient to stimulate, by way of the corpus callosum, the major area of Wernicke. If the major area of Wernicke is ablated, stimuli may reach the minor hemisphere over the corpus callosum, and the minor area of Wernicke may effectually assume the function of the major side. The auditory aphasia expected would be less obvious. Similar analogies in the other language areas may be assumed, but the factor of relative development and functional capacity of the minor side must be carefully considered. Since the auditory radiation is included in the temporal isthmus a lesion in its proximity may, among other symptoms, produce cortical deafness. Likewise a lesion may affect the optic radiation and produce an homonymous hemianopsia. Alexia may develop from a lesion affecting the major angular gyrus which would be stimulated then only from the minor temporal isthmus side. The stimulation from this side is sufficient for recognition of written words but not for their interpretation. This is the condition called alexia. A lesion between the language formulation area and the area of Broca may isolate the major area of Broca to produce motor aphasia unless stimuli from the minor language formulation area are not interrupted also in the major temporal isthmus. A massive lesion of

the temporal isthmus may result in a total, expressive-receptive type of aphasia.

Conclusions and Summary

An attempt has been made to present a succinct review of some of the more important psychological, physiological and anatomical data relevant to an understanding of aphasia. A knowledge of the kinesthetics of language function is an integral part of the study of the emotional, social and economic problems of the aphasic. A definition of aphasia aids in excluding the fields of agnosia and apraxia. Moreover this definition emphasizes the fact that language function is not an exclusive capacity of any one part of the brain but must be an integrated interaction of all the phases of reception, formulation and expression.

Characteristic personality changes following brain injury are further complicated by the alterations peculiar especially to the aphasic. The more obvious of these are changes in attention, behavior deviations of the infantile type, loss of planning or conceptual thinking, psychomotor retardation, reduced initiative and memory changes. The faculty of insight complicates the fundamental problems of anxiety, inadequacy and frustration.

Hereditary factors of brainedness and handedness play major roles in the function of residual cerebral tissue after injury. Relative capacity is influenced by age, training and especially motivation. Several of the more accepted studies regarding the manner in which cortical tissue functions on the non-verbal, silent planes of cerebration are discussed. Electrical stimulation is a favorite and revealing method presenting some evidence of the diffuse nature of the speech areas. Diverse physiological changes in language function result from anoxia, drugs, intracranial pressure changes and hypnosis. The feed-back and reverberating circuit theory, together with the mass action theory, are offered as partial and presumptive evidence of the functional interrelationship or capacity of the human brain.

The more accepted and well-known areas of the cerebral hemispheres and associated pathways are discussed. The receptive centers and the motor system are integrated into the discussion to define their relative roles and importance to language function as a whole. The angular gyrus is concerned with the visual integration of language; the area of Wernicke is concerned with the auditory aspects. The language formulation area is the keystone of language function from reception of stimuli to activation of the speaking and writing systems. The area of Broca is related to the coordination of speech emission movements; whereas, the frontal writing center of Exner has a similar function for writing movements. The vital roles of the external capsule and the temporal isthmus in linking these above areas emphasizes again the complexity of the areas concerned with language function. A lesion directly or indirectly affects one and all regions. Only thorough testing, which is admittedly incomplete today, may expose all language deficits. The controlling influence of the thalamus in attention of these language areas to stimuli is as significant as the function of any of the above areas. Each area is a chain-like link in the study of the aphasic.

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Discussion

Dr. John C. Allen (Hartford, Conn.): May I congratulate the authors on an extremely well organized and presented paper on a difficult subject. This subject, as we all realize, is extremely important in the concept of total rehabilitation. In my opinion, there should be a much wider understanding and appreciation of the problems of this condition, not only relative to the underlying basic anatomy, physiology and pathology but also to the accompanying psychologic aspects. Not only does this apply to the problems of aphasia but also to the several other disorders commonly related but not usually listed under this heading. I refer to the speech problems so frequently seen in the exceptional child and in cerebral palsy.

The authors, in this presentation, have indicated many widely separated areas having to do with speech other than the so-called speech center or Broca's Area, including "speech arrest" areas found by electrical stimulation, by both Penfield and Rasmussen. It should also be noted that in 1948, Sugar, Chusid and French described a second motor cortex in the

monkey deep in the sylvian fissure under the parietal operculum. This has also been shown to exist in the human by Penfield who has produced both vocalization and speech arrest by stimulation of this region. It has also been demonstrated that a supplemental motor cortex exists on the medial surface of the frontal lobe which again responds to electrical stimulus both by vocalization and speech arrest.

Tracing of pathways in this paper is excellent, but obviously it is only a sketch of the tremendously intricate system. With this tracing of pathways it is understandable why Nielsen states that aphasia doesn't occur in children under

five years of age with only one-sided brain damage. Between the ages of five and ten he indicates that damage to the dominant hemisphere causes language loss lasting only a few weeks. After the age of ten the older the patient the more lasting is the interference. It might be mentioned that Sugar also underlines the effect of dominance on this problem.

We all have seen the rapid clearing of aphasic syndromes following cerebral vascular accidents and certainly many of us have seen the remarkable clearing of aphasia in youngsters with widespread brain damage. Certainly this paper does much to assist in the understanding of such improvement.

The Quadriplegic Standing Frame

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One of the results of the team approach to rehabilitation of the severely disabled veteran was the development of a Quadriplegic Standing Frame. This was accomplished through the cooperative efforts of an orthopedic technologist and a corrective therapist, working under medical supervision, and resulted in an improved technic in the treatment of the paraplegic and partial quadriplegic patient.

A need existed for an inexpensive and adaptable piece of equipment that would offer a safe method for placing the paraplegic and partial quadriplegic patient in the standing position for weight bearing purposes (fig. 1). The purpose of this paper then, is to present the therapeutic and economic need for such a device; its practical value for treatment, and a description of the design and construction of the standing frame.

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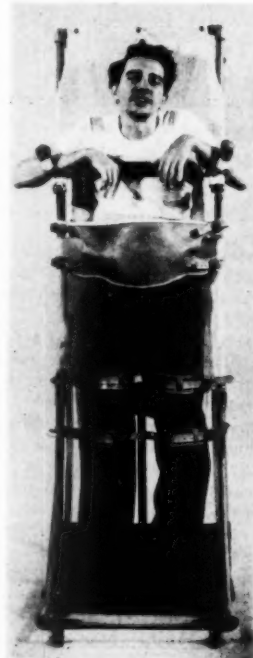


Fig. 1 — Quadriplegic Standing Frame in upright position illustrating method of securing patient to the frame.

In the treatment of paraplegic and partial quadriplegic patients, the upright, standing position tends to place the long bones of the lower extremities in a weight bearing position and thus helps to prevent demineralization within the bone. The bone is then prevented from becoming more brittle and susceptible to fracture. Abramson states "The constant use of the wheelchair would favor the formation of flexion contractures. The complete loss of weight-bearing would mean the loss of the most important stimulus for the formation of protein bone matrix. As a result, calcium would pour out of the bones and osteoporosis, urinary calculi, soft-tissue, ossification and even pathological fractures might result."¹

to be fabricated. For those patients where bracing is contraindicated, this device is used to afford the benefits of standing. For those patients where bracing is indicated, braces are fabricated for ambulation purposes. This process of evaluation results in economy with more purposeful treatment. The standing frame accomplishes therapeutic results similar to those afforded by long leg braces, but it is more effective in that it allows the physician to initiate treatment at the earliest possible time. The cost of constructing a Quadriplegic Standing Frame is \$38, which is a small sum when compared to the approximate \$300 cost of a pair of long leg braces with all the necessary attachments. Further, since it is no longer necessary

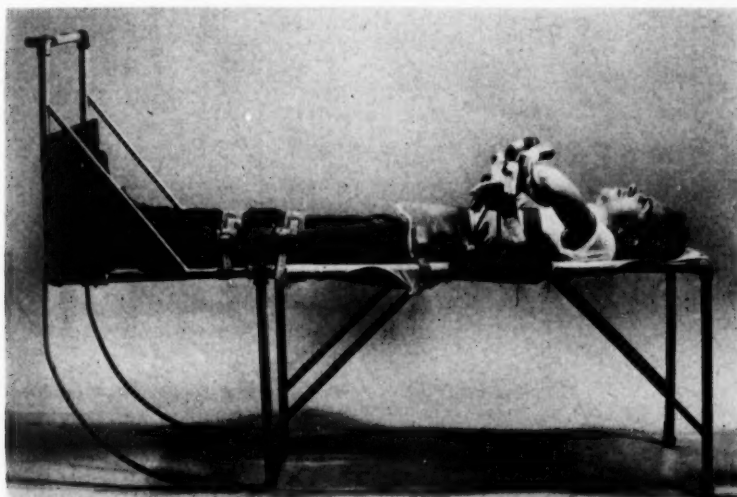


Fig. 2 — Quadriplegic Standing Frame in starting position for treatment.

Since it is medically desirable for patients with residuals from paraplegia and partial quadriplegia to be placed in the standing position for weight bearing, it was necessary to devise a therapeutically sound treatment method, as well as safe in application, and of reasonable cost. The Quadriplegic Standing Frame meets these demands and has several advantages over previous methods involving the use of long leg braces and stationary walkers. The frame is prescribed for treatment until it is determined medically desirable for braces

for the therapist to obtain the braces from the storage rack and assist in their application, there is a saving of about two hours per therapist for every sixteen patients treated. Because of the design of the Quadriplegic Standing Frame, the patient is more securely fixed, giving him added self-confidence during treatment. If a patient has a tendency toward syncope during treatment, it is possible for the therapist to lower the patient to the horizontal position within a few seconds, thus relieving this condition (fig. 2). Another advantage of the frame

is that a better postural alignment is obtained with more equal distribution of body weight on the lower extremities.

Construction and Design

The Quadriplegic Standing Frame is constructed of $\frac{3}{4}$ inch galvanized water pipe with necessary elbows to form the frame. It is covered with canvas, which is drawn across the back and tied so

enough and to offset the patient's sensations of leaning forward. The arm support is patterned after the standard crutch axillary support with a rubber pad. The arm support is welded to the bar inside the $\frac{3}{4}$ inch upright pipe with a slit 12 inches long to allow for adjustment to the patient's height. The "U" shaped forearm support is bolted through the front edge of the arm sup-

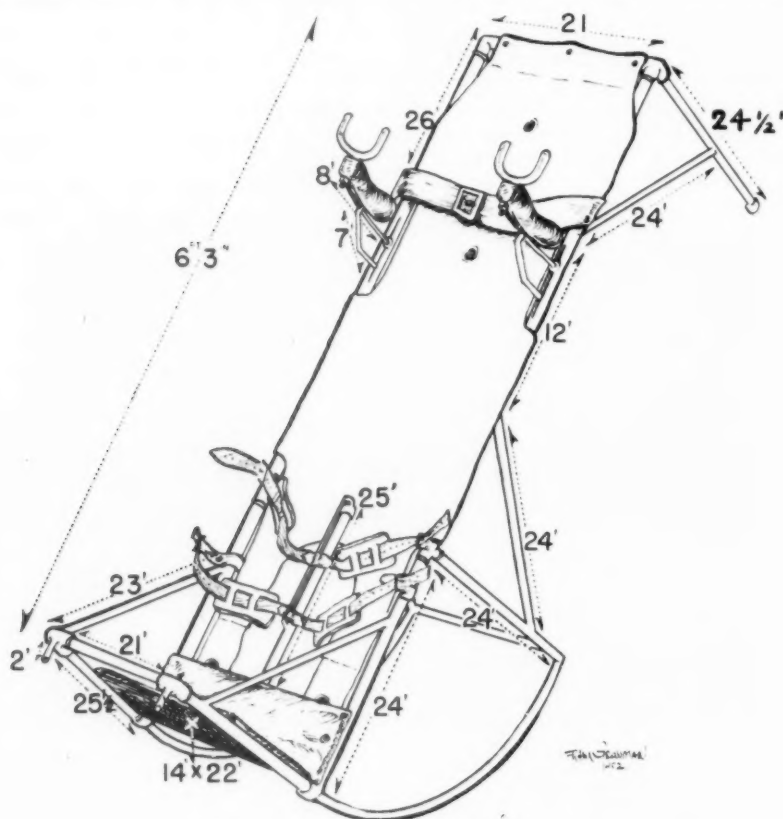


Fig. 3 — Detailed drawing for fabrication of the Quadriplegic Standing Frame.

that it may be easily removed for cleaning. The legs and rocker are braced with rods for added support. A piece of strap steel is welded to the frame and lower supports to form the rocker. The foot rest consists of a piece of plywood covered with a waterproof fabric. Two pieces of 2 inch pipe are welded to the under surface of the leading edge of the foot rest in order to tilt the frame

port. Straps are used for support above and below the patella and across the chest to maintain body alignment (fig. 3).

Summary

Briefly discussed are the therapeutic and economic needs which led to the construction of an inexpensive adjustable standing frame for paraplegic and

partial quadriplegic patients. Also stated are the clinical uses of the Quadriplegic Standing Frame, as well as its design and construction.

Conclusion

Better posture and body alignment are obtained through the use of the Quadriplegic Standing Frame in early treatment phases.

It is safer than the brace method in the initial phase of treatment.

The comparative cost of construction is about one-tenth of that of long leg braces.

Time is saved for therapists through the use of this equipment and releases

him for additional treatment purposes.

The fear of falling is greatly reduced—a psychological factor important for effective treatment.

Patients with labile blood pressures and a tendency to faint are quickly and easily lowered to the horizontal position by one therapist.

Acknowledgement — The authors acknowledge the assistance of Thomas Masterson, Tim Dodge and Frank Grossman of the Medical Illustration Department.

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MEDICAL NEWS

Members are invited to send to this office items of news of general interest, for example, those relating to society activities, new hospitals, education, etc. Programs should be received at least six weeks before the date of meeting.

PERSONALS

Earl F. Hoerner is now with the Bureau of Chronic Diseases, Department of Health, Pennsylvania. His job, effective January 1, 1954, is to coordinate the state's program in chronic disease and rehabilitation. He has also received a teaching appointment with the Division of Occupational Health, Rehabilitation Service, Graduate School of Public Health, University of Pittsburgh. — In January, **Samuel G. Feuer**, Brooklyn, spoke before the members of the staff of Roslyn Park Hospital, Roslyn, L.I., N.Y., on the subject "Physical Medicine and Rehabilitation in General Practice." On February 9, 1954, Dr. Feuer was a panel member of a symposium on "Low Back Problems," before the Bay Ridge Medical Society of Brooklyn. He had an exhibit on hemiplegia and participated in a panel discussion on "Rehabilitation of the Hemiplegic" and "Prophylaxis and Treatment of Lower Extremity Contractures in Children," on March 9, as part of a post-graduate course on Chronic diseases of the Neuro-Musculo-Skeletal Sys-

tem, held at the Jewish Sanitarium and Hospital for Chronic Diseases of Brooklyn. — **Ralph E. Worden**, Columbus, Ohio, recently returned from a three-week Post-Graduate Course at U.C.L.A. on Upper Extremity Prostheses. — The International College of Pediatrics, Havana, Cuba, heard **Ferdinand F. Schwartz** speak on "Physical Medicine in Cerebral Palsy" in October of last year. Dr. Schwartz addressed the Medellin Medical School in Colombia, S. A. in February of this year. His subject was "Physical Medicine and Rehabilitation in Traumatic and Orthopedic Cases." At the Atlantic Medical Society in Baranquilla, S. A., he presented a clinic on "Ultrasonics in Bursitis." The topic "Physical Medicine in Arthritis" was given at the April meeting of the Alabama Medical Society State meeting. — **S. Malvern Dorinson**, San Francisco, attended the regional meeting of the United Cerebral Palsy Associations at Los Angeles in January, 1954 as a delegate from the San Francisco Chapter. — A seminar on Cerebrovascular Disease was held at the University of Maryland School of Medicine on February 20. **Louis N.**

Rudin, Baltimore, chose the subject "Care of Residual Disability." — **Christopher J. D. McLoughlin**, Atlanta, Ga., spoke at a public health forum on March 23. His subject was "You and Your Stomach Ulcers." — A one-week course in Upper Extremity Prosthetics, University of California Training Center, Los Angeles, was attended from February 8-12 by **Raoul C. Psaki** of San Francisco. — The Woman's Medical College of Pennsylvania presented a Health Assurance Forum in March. **Donald A. Covalt**, New York City, was moderator for the panel "Going Back to Work" and **George M. Piersol**, Philadelphia, presented the topic "To Keep Our Bodies As Fit As Our Machines." — **Arthur A. Rodriguez**, Chicago, gave a paper entitled "Electrodiagnostic Therapeutic Modalities in Facial Nerve Paralysis" at a meeting of the Chicago Laryngological and Otological Society, Drake Hotel, February 1. Dr. Rodriguez has been appointed Clinical Associate Professor of Physical Medicine and Rehabilitation at the Stritch School of Medicine, Loyola University. — "After thirty-six years of continuous practice of medicine in Pasadena, **John S. Hibben** has retired. — **Howard Rusk**, New York City, discussed "The Physician and the Changing World" at the College of Physicians of Philadelphia on March 3. — **Karl Harpuder**, New York City, spoke at the combined meeting of the New York Heart Association, Inc., and the Clinical Society of the New York Diabetes Association in March on "Medical Management of Peripheral Arterial Occlusive Disease." — A scientific exhibit entitled "A Group Approach to Cerebral Palsy" was presented by **Joseph Koczur** and others at the Annual Clinical Conference of the Chicago Medical Society held in Chicago in March. — **John H. Kuitert**, Fort Sam Houston, Texas, was the principle speaker at the meeting of the Alamo District of the International Council for Exceptional Children held in San Antonio on March 12. The subject of his talk was "The Privileges and Responsibilities for Care of Crippled Children in a Democracy." — Associate editors of the Bulletin, American Rehabilitation Committee, Inc., New York City, are **Madge C. L. McGuinness** (Physical Medicine) and **Harold D. Storms** (Industrial Rehabilitation).

CONFERENCE ON CARE OF LONG-TERM PATIENT

The National Conference on Care of the Long-Term Patient was held on March 18-20, Edgewater Beach Hotel, Chicago. Among the speakers were Leonard W. Mayo; Dr. Dean W. Roberts, Dr. George Lull and Dr. Leonard Scheele.

UNIVERSITY OF MICHIGAN WORKSHOP ON AGING

"Aging—Everybody's Business" is the title of the University of Michigan's Seventh Annual Conference on Aging to be conducted as a workshop in Ann Arbor, Michigan, June 28-30, 1954. The workshop will provide participants with the opportunity to exchange ideas with persons of varied experience, to define responsibility for the tasks that lie ahead, and to establish bench-marks for the creation of an environment in which the senior citizen can enjoy life-long development. Leaders in health, business, employment, labor, education, rehabilitation, social work, religion, housing, recreation, community organization, city planning, and government are invited to attend, as are members and officials of fraternal organizations, women's clubs, service organizations, retirement groups, and voluntary organizations. Older people are especially invited. They will have the opportunity to gain a better understanding of their role, and their participation will focus attention upon issues with which they are most concerned. For further information, write to Dr. Wilma Donahue, Chairman, Division of Gerontology, 1510 Rackham Building, Ann Arbor, Michigan.

SOUTHERN CALIFORNIA SOCIETY OF PM&R

On Tuesday, March 2, the Southern California Society of Physical Medicine and Rehabilitation met at the Association Auditorium. The subject presented was "External Upper Extremity Prostheses."

NEW ENGLAND SOCIETY OF PHYSICAL MEDICINE

A "Symposium on Ultrasound" was presented at the February meeting of the New England Society of Physical Medicine. Fritz Friedland spoke on "Ultrasonic Therapy with Special Reference to Rheumatic Diseases" and Bernard J. Doyle's subject was "Case Presentation and Demonstration of Therapeutic Application of Ultrasonics." The March meeting had on its program the following papers: "Arthritic Disabilities of the Knee" by John G. Kuhns, M.D.; "Treatment of Traumatic Complications" by Robert S. Hornell, M.D.

APPOINTMENTS MADE BY PRESIDENT

Dr. Wm. Benham Snow has appointed Dr. Sedgwick Mead and Dr. Jessie Wright as official representatives at the International Poliomyelitis Congress in Rome, September, 1954.

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A MESSAGE FROM THE PRESIDENT— The Current Problem of Physical Medical Practice and Ancillary Personnel to Such Practice



Wm. Benham Snow

The expanding need for treatment by physical medicine, brought about by greater accent on the treatment of chronic illness and positive increase in life span, brings with it a need for reorganization of therapeutic services. Parallel with this period of life extension has come an alteration in hospital functioning, hospital stay, and forward looking more complete rehabilitation of the sick patient. Though the medical profession senses the change, there is need for organization to meet the overall needs which are becoming more obvious. It is the duty of our specialty to lead in such planning.

The increased cost of medical care in hospital setups has brought with it an unequable compensation to the professional auxiliary workers as compared to the nonprofessional supporting staff. These professional auxiliary workers are being delegated more and more responsi-

bility in patient care and represent those without whose services the hospital would cease to give the care for which it exists.

This situation is reflected in the need today for "pump priming" of recruiting services through all media—undergraduate campus contacts, stimulating career brochures, radio and television,—to encourage young students to enter these fields. Financially the offers are misleading, as security is only to be found today at the top of these medical auxiliary fields. This does not mean that it will remain this way, but it does indicate a need for constructive planning for the future if full and adequate service is to be rendered our patients.

The lack of candidates for these professional studies is also influenced by rise in cost of living, the necessary increases in college tuition, and lack of scholarship aid.

The hospital administrator values the services of these workers, but with an eye to a balanced budget, he feels that he must see additional income before he can safely increase expenditure. This seems logical, but some credit must be given to Physical Medicine for the hidden asset of increasing the turnover by freeing beds, and so enabling the hospital to spread its influence over a greater proportion of the population it would serve. Unfortunately, the name of the patient who occupies a ward or private bed does not alter the total income per bed in the hospital. The income will never exceed that of the total bed capacity.

The cost of medical services in hospitals is at a level where the self-respecting independent patient who needs re-

peated treatments no longer can afford to contract for them. If financial adjustment is made by the hospital to provide the necessary treatment, the hospital further lessens departmental income and also lessens the possibility for across-the-board salary raises to these valuable medical assistants.

The answer, as we know, is that the average therapist working in a hospital, unable to earn an adequate income during his routine day's work, treats patients for staff physicians evenings and weekends in the patients' homes. In an increasing number of states, this is only possible if the therapist is licensed or registered in the state in which he works.

There is an increasing number of ethical therapists, not employed by medical institutions, who treat patients in their homes under controlled medical supervision. The professional services of these therapists are more adequately compensated by this method.

A happy worker is a cooperative worker. The underpaid or overworked and discontented worker is the one most apt to step out of line with prescribed practice.

There is more and more rationality in therapists administering prescribed treatment in patients' homes, with economy to the patient and the hospital, with less inconvenience and fatigue to the extremely weak patient or one suffering with pain. This eliminates the expense of transportation, and gives an adequate compensation to the therapist.

Clinics today must charge for their services where it is possible to collect. Free services are generally tendered only after complete social service investigation. The rates for clinical services, as with ward in-patient services, are slowly rising and collected whenever possible without unnecessary hardship. The out-patient charged for Physical Medical services are to the white-collar clinic

patient at a point where he could receive private care in a physician's office. In the out-patient private services in Physical Medicine, the rates are often prohibitive. This evolutionary change in hospital finance may cure itself, if physicians are able to adjust private office fees to meet the patient's ability to pay. Much treatment may be given in the home or physician's office, which previously has been given in the hospital.

Rehabilitation centers are being organized. These are very diverse in their auspices, purposes, methods and supervision. They, like hospitals, have grave financial problems. These financial problems are probably greatest in the area of recruiting patients, because the medical profession is not yet aware of the unique function which the rehabilitation center can occupy in the full care of the patient. In these rehabilitation centers, workers from various professional disciplines will work. Today considerable overlapping in function exists among occupational therapists, physical therapists, recreation assistants, and other physical rehabilitation workers under miscellaneous titles.

The Congress committee on Medical Auxiliary Services related to Physical Medicine and Rehabilitation is struggling with this total problem. Members of this committee are cognizant of all the various facets involved. We look ahead eagerly to their recommendations at the annual meeting on such matters as personnel needs for physical medical practice, types of personnel, allocation of responsibilities of the various ancillary personnel, suggestions concerning the educational needs of various types of workers, and constructive curricular needs.

Joe Brulaw Snow

(Continued from page 240)

RECENT PUBLICATIONS BY MEMBERS

Harvey E. Billig, Jr., "Traumatic Neck, Head, Eye Syndrome." *Journal of International College of Surgeons*, November, 1953.

Anthony C. Cipollaro, "Radiation Therapy of Some Dermatologic Disorders." *The New England Journal of Medicine*, February 4, 1954.

Eugene Neuwirth, "Management of Sciatica by Vertebral Traction." *Rheumatism*, January, 1954.

J. L. Hollander, with co-authors, "Locally Administered Hydrocortisone in Rheumatic Diseases: Summary of Its Use in 547 Patients." *American Journal of Medicine*, November, 1953; "Intra-Articular Hydrocortisone in Treatment of Arthritis." *Annals of Internal Medicine*, October, 1953.

F. J. Kottke, with co-authors, "Splanchnic Nerve Stimulation in Dog." *American Journal of Physiology*, September, 1953.

Frances A. Hellebrandt, "Disability, Rehabilitation of the Law of Damages; Implications of Modern Rehabilitation Medicine." *Industrial Medicine and Surgery*, December, 1953.

Robert M. Stecher, "The Genetics of Rheumatoid Arthritis; Analysis of 224 Families." *American Journal of Human Genetics*, June, 1953.

Louis N. Rudin, "Crutch Paralysis." *Current Medical Digest*, January, 1954.

Anthony C. Cipollaro, with co-author, "Cutaneous Manifestations of Systemic Diseases." *The New England Journal of Medicine*, January 14, 1954.

John H. Aldes, with co-authors, "A New Approach to the Treatment of Subdeltoid Bursitis." *American Journal of Physical Medicine*, February, 1954.

Bruce B. Grynbaum, "An Evaluation of the Clinical Use of Ultrasonics." *American Journal of Physical Medicine*, February, 1954.

George W. Geiss, with co-authors, "Apparatus Aids: Adapted Floor Loom for Strengthening Weak Ankle Dorsiflexors." *The American Journal of Occupational Therapy*, January-February, 1954.

A. L. Watkins, "Rheumatoid Arthritis in Industrial Medicine." *New York State Journal of Medicine*, October 15, 1953.

Jerome W. Gersten, "Ultrasonics and Muscle Disease." *American Journal of Physical Medicine*, February, 1954.

Frank H. Krusen, "Physical Medicine and Rehabilitation as Related to Industrial Health." *Archives of Industrial Hygiene and Occupational Medicine*, July, 1953.

Frank H. Krusen, with co-author, "Pain from Standpoint of Physical Medicine." *Journal-Lancet*, October, 1953.

John H. Kuitert, "Ultrasonic Energy as an Adjunct in the Management of Radiculitis and Similar Referred Pain." *American Journal of Physical Medicine*, February, 1954.

Howard A. Rusk, with co-author, "Rehabilitation Following Cerebrovascular Accident." *Southern Medical Journal*, November, 1953.

Hans J. Behrend and Jerome Weiss, "Ultrasonic Therapy in Geriatric Practice." *American Journal of Physical Medicine*, February, 1954.

Jack Meislin, "The Function of a Physical Medicine and Rehabilitation Service in a VA Psychiatric Hospital." *Department of Medicine and Surgery Information Bulletin*, January, 1954.

Arthur C. Jones, "Clinical Observations in the Use of Ultrasound." *American Journal of Physical Medicine*, February, 1954.

Sedgwick Mead, with co-authors, "Study of Effects of Oral Administration of Meprolo® in Old Individuals." *Journal of Gerontology*, October, 1953.

Sedgwick Mead, with co-authors, "A Placebo-Controlled Study of Ultrasound Treatment for Periarthritis." *American Journal of Physical Medicine*, February, 1954.

Peter A. Volpe, "Physical Medicine and Rehabilitation in the Veterans Administration." *Department of Medicine and Surgery Information Bulletin*, January, 1954.

Ferdinand F. Schwartz, "The Value of Ultrasonics in Physical Medicine." *American Journal of Physical Medicine*, February, 1954.

L. W. Eichna, with co-author, "Venous Pressures in Venae Cavae of Man." *Journal of Clinical Investigation*, November, 1953; with co-authors, "Induced Congestion of Superior and Inferior Vena Cava of Man." *Journal of Clinical Investigation*, November, 1953.

Disraeli Kobak, "Unity and Concord A Desideratum in Clinical Research on Ultrasonics." *American Journal of Physical Medicine*, February, 1954; "Some Physiologic Considerations of the Therapeutic Action of Ultrasonics." *American Journal of Physical Medicine*, February, 1954.

AMERICAN ACADEMY FOR
CEREBRAL PALSY

The eighth annual meeting will be held on November 5, 6, and 7, 1954, Williamsburg Inn, Williamsburg, Virginia.

AMERICAN PHYSICAL THERAPY
ASSOCIATION

The 31st Annual Conference of the American Physical Therapy Association will be held at the Hotel Statler, Los Angeles, California, June 27-July 2, 1954.

COURSE IN MEDICAL JOURNALISM AND WRITING

The University of Illinois at Urbana, School of Journalism and Communication announces a 4-year course in medical journalism and writing at the following schools: University of Missouri, Columbia, Mo., and University of Illinois at Urbana. These collegiate courses lead to bachelor degrees. For additional information, write to: I. W. Cole, University of Illinois, School of Journalism and Communications, Urbana, Illinois and/or Earl English, Dean, School of Journalism, University of Missouri, Columbia, Mo.

LECTURES ON AGING

Martin Gumpert, M.D., will present a series of lectures on "Problems of Aging" at the Kessler Institute for Rehabilitation, West Orange, N.J. The dates and titles follow: "What Is Aging?" April 15; "Normal Old Age" April 22; "Social Problems of Aging" April 29; "Medical Problems of Aging" May 6; "Medical Problems of Aging" May 13, and "Old Age Has a Future" on May 20, 1954. The registration fee for all six lectures is \$5.00. Interested persons should contact Miss Joyce M. Collins, Conference Registrar, Kessler Institute.

LATIN AMERICAN CONGRESS OF PHYSICAL MEDICINE

At the Fifth meeting of the Latin American Congress of Physical Medicine, held in Medellin, Columbia, February, 1954, Congress speakers and their subjects were: "Rehabilitation" by Norman E. Titus; "Rehabilitation in Paraplegia" by Miguel A. Aguilera; "Treatment with Ultra Sound Waves" by E. F. Carter. Dr. Cassius Lopez de Victoria showed films on behalf of the Institute of the Crippled and Disabled.

PUBLICATION ON SHELTERED WORKSHOPS AVAILABLE

"A Survey of Sheltered Workshops Operated by Jewish Vocational Agencies" is available at the cost of \$1.00. For additional information, write to the Jewish Occupational Council, 1841 Broadway, New York 23, N.Y.

NEW YORK SOCIETY OF PHYSICAL MEDICINE

The following officers have been elected for 1954: Morton Hoberman, President; Arthur S. Abramson, Vice-President and Jerome Weiss, Treasurer. The Executive Committee consists of Hans J. Behrend, Chairman; Otto Eisert; Henry Fleck; Bruce B. Grynbaum, and Irving Tepperberg. The Secretary is Madge C. L. McGuinness.

BIRTCHER WORD BOOK

A new addition of The Birtcher Word Book is available to the medical profession and associated personnel free of charge. Requests should be directed to The Birtcher Corporation, Los Angeles, California.

INDUSTRIAL HEALTH CONFERENCE

The 1954 Industrial Health Conference was held in Chicago, April 24-30, Hotel Sherman. Copies of speeches, program, etc., can be had by writing to Ruth Brannan, Publicity Committee, Industrial Health Conference, 205 N. LaSalle St., Chicago.

NEW APPOINTMENT MADE

Dr. Sue Browder has been appointed Attending Psychiatrist at Blythedale, Valhalla, New York. She will spend an exploratory period with the view of establishing the type and extent of the psychiatric service needed at Blythedale. Dr. Browder is currently Associate Attending Psychiatrist at the Hospital for Special Surgery and Assistant Attending Neurologist at the Neurological Institute. Her work has been in the field of the emotional needs of the neurologically handicapped, with especial emphasis on cerebral palsy and epilepsy.

Blythedale is an orthopedic hospital and rehabilitation center for children. The institution offers physical therapy and rehabilitation services to orthopedically handicapped children of normal mentality.

ANNOUNCE WORLD AWARDS FOR REHABILITATION FILMS

Films of outstanding value in the worldwide development of services for the disabled will be recognized by newly established International Film Awards to be presented at the Sixth World Congress of the International Society for the Welfare of Cripples at The Hague, Netherlands, September 13 to 17, 1954.

The Society has established these awards in recognition of the great value of motion pictures in facilitating the exchange between countries of information concerning all phases of services for handicapped persons.

Nominations for films to be considered for the awards should be sent to the International Society for the Welfare of Cripples, 127 East 52nd Street, New York 22, N.Y., U.S.A. A full description of the film should be included together with information concerning the production and distribution rights and the availability of the film for screening.

NEW UNIT AT NYU

The department of neurosurgery, in conjunction with the department of physical medicine and rehabilitation, of New York University-Bellevue Medical Center has recently established a peripheral nerve injury unit. Dr. Thomas I. Hoen, professor and chairman of the department of neurosurgery, NYU Post-Graduate Medical School, and Dr. Howard A. Rusk, professor and chairman of physical medicine and rehabilitation, NYU College of Medicine, are jointly directing the clinic's operation. The unit has been placed in operation at the Institute of Physical Medicine and Rehabilitation (400 East 34 Street, New York City). The clinic is open on Mondays and accepts only patients referred by physicians.

Complete clinical studies are being done, including the following tests: 1) Muscle function; 2) Sensory examination; and 3) Electrodiagnostic studies. Electrodiagnostic studies will include electromyography; electrodiagnostic testing with stimulation; chronaxie measurements, eventually strength-duration curves; and measurements of the electrical skin resistance. Photographs and moving pictures will be taken whenever it is felt necessary.

CEREBRAL PALSY WORKSHOPS

Intensive workshops in guidance and instruction of the adolescent and adult with cerebral palsy will be held this summer at three graduate schools of education. The workshops are being sponsored by United Cerebral Palsy in cooperation with the host schools. Scholarships will be available. The workshops are being held to assist teachers, counselors, social workers, therapists, nurses, and personnel in related fields in providing realistic vocational counseling to the cerebral palsied.

The scholarships, covering tuition and material costs, maintenance and travel, are available to persons who wish to continue their study for professional advancement or to complete degrees. All applicants must have the necessary pre-requisites for admission to a graduate school. The workshops will be held at Boston University, Boston, Mass., June 28 to July 8; University of Kentucky, Lexington, Ky., July 9 to August 3; and Temple University, Philadelphia, Pa., August 10 to August 31. The course values of these sessions will be three semester hours or credits. Appointments will be made for the summer session only. Further information and scholarship application forms may be obtained from Mr. Ernest Fleischer, United Cerebral Palsy, 50 West 57th Street, New York 19, N.Y.

FOUNDATION FELLOWSHIPS

The National Foundation for Infantile Paralysis announces the availability of a limited number of postdoctoral fellowships in the field of public health and preventive medicine. The purpose of these National Foundation fellowships is to prepare physicians to fill the many vacancies existing in public health and preventive medicine, with priority to those who are interested in entering the teaching field. The fellowships are for one or more years at an approved school of public health, with a period of field experience when arranged by the school. Stipends to Fellows are based on the individual need of each applicant. Fellowships may cover tuition, maintenance and an allowance for books, if required. Appropriations of \$320,600 in March of Dimes funds have been made to cover the cost of the program. Eligibility requirements include United States citizenship, sound health, graduation from an approved school of medicine and completion of at least a one-year internship in an approved hospital. Selection of candidates will be made on a competitive basis by a Clinical Fellowship Committee composed of leaders in the fields of medicine and professional education.

Complete information concerning qualifications and applications may be obtained from the Division of Professional Education, National Foundation for Infantile Paralysis, 120 Broadway, New York 5, N.Y.

NEWLY REGISTERED THERAPISTS

February 19, 1954

Georgen, Paul Edwin, 615 Best St., Buffalo 8, N.Y.

Kehl, Marjorie Joan, 119 N. Second St., Jeannette, Pa.

March 1, 1954

Alexander, Victor Joseph, 39 Tracy Avenue, Torrington, Conn.

Barnard, Elliott Joseph, 2 Proctor St., Ashburnham, Mass.

Bauman, Walter William, Jr., 566 Winthrop Ave., New Haven, Conn.

Crabbe, Eric James, 1440 Meyers St., Honolulu 17, Hawaii.

Gillies, John Augustas, 34½ Hovey, Pontiac, Mich.

Griswold, Elma Tress, RFD #1, Claremont, N. H.

Ianuzzi, Nicholas, Amity Rd., Woodbridge, Conn.

Keller, Mary Louise, 4263 Norfolk Ave., St. Louis, Mo.

Slattery, Sr. M. Jonathan, 6420 Clayton Rd., St. Louis, Mo.

Smith, Harold G., 248 Lexington Ave., Astoria, Ore.

March 4, 1954

Bedini, Sara Joan, Saw Mill Hill Rd., Ridgefield, Conn.

Currier, Priscilla Nan, S. Main St., Colebrook, N. H.

Gates, Phyllis Ethel, 22 Boynton, Jamaica Plain 30, Mass.

Gibbs, Mary Birdsall, 24 Beech Rd., New Rochelle, N. Y.

Hall, Prudence Lane, Main Rd., Falmouth, Mass.

Metz, Marguerite Mary, RD 1, East Genesee, Fayetteville, N.Y.

Reed, Barbara Warren, RD 2, Main St., Stepney, Conn.

Toltz, Carole Joan, 4 Warren Ave., Chelsea 50, Mass.

Wilmer, Sheila Lewis, Box 104, Granville, N.Y.

March 5, 1954

Welcker, Carolyn Dorothy, RFD 5, Box 111, Charleston, W. Va.

March 9, 1954

Lide, Rebecca Worth, 3957 Hawthorne Ave., Palos Verdes Estates, Calif.

BOOK ON REHABILITATION

The rehabilitation of injured workmen with hand and arm disabilities is the subject of a new 48-page illustrated book just published by the Institute for the Crippled and Disabled, rehabilitation center at 23d Street and First Avenue, New York City. The book is a compilation of professional papers presented at a conference held in April 1953 of leading physicians, compensation insurers, officials of government agencies concerned with workmen's compensation matters and rehabilitation experts of the Institute for the Crippled and Disabled's staff.

Dr. Edward E. Gordon, Institute Medical Director and staff member of the Columbia University College of Physicians and Surgeons, presents a paper in the book on the team approach to upper extremity prosthetic problems. Other portions of the book are devoted to procedures in the rehabilitation of hand and arm injuries, and the importance of proper fitting of artificial appliances.

Copies of the book are available at one dollar each, postage prepaid, from the Institute for the Crippled and Disabled. A 25 per cent discount for quantities of 25 or more will be given.

APPARATUS ACCEPTED

The following information relative to apparatus accepted by the Council on Physical Medicine and Rehabilitation of The American Medical Association is reprinted, with permission, from the following issues of the

JOURNAL: February 6, February 13, February 20 and March 6, 1954.

M. H. E. Refrigeratic Oxygen Tents, Models RV-2 and RV-3: Modern Hospital Equipment, Inc., 119 N. Fourth St., Minneapolis 1.

The M. H. E. Refrigeratic Oxygen Tent consists of two principal parts: a canopy of transparent material to be suspended over the patient's bed and a cabinet housing the machinery for humidifying, cooling, and circulating the oxygen.

The cabinet is mounted on large casters so that it can be rolled alongside the bed; it measures 84 (height) by 71 by 46 cm. (33 by 28 by 18 in.). Model RV-2 weighs 87 kg. (191 lb.); Model RV-3 weighs 93 kg. (206 lb.).

The models differ in the motor-compressor units. Model RV-2 has a one-fifth horsepower compressor, and its motor draws 650 watts. Model RV-3 has a one-third horsepower compressor, and its motor draws 860 watts. Both units require a source of 60 cycle alternating current at 115 volts. The shipping weights for Models RV-2 and RV-3 are 107 and 113 kg. (235 and 250 lb.), respectively.

Evidence indicating sound construction and satisfactory performance was obtained from sources acceptable to the Council.

Otarion Hearing Aid, Model B-15: Otarion, Inc., 4757 Ravenswood Ave., Chicago 40.

The Otarion Hearing Aid, Model B-15 uses three vacuum tubes, one 1.5 volt mercury type A-battery, and one 15 volt B-battery. The body of the instrument measures 62 by 45 by 22 mm. and weighs 70 gm. With batteries, earphone, and receiver the total weight is 108.5 gm. Evidence indicating sound construction and satisfactory performance was obtained by the Council.

Maico Maxitone Hearing Aid: The Maico Company, Inc., 21 N. Third St., Minneapolis 1.

The Maico Maxitone Hearing Aid is a three tube instrument powered by one 1.5 volt A-battery of the mercury type and one 15 volt B-battery. The amplifying system is housed in a plastic case that measures 64 by 47 by 22 mm. and weighs 53 gm. The receiver weighs 8 gm., the receiver cord 5 gm., the A-battery 13.5 gm., and the B-battery 12 gm., making a total weight of 91.5 gm.

Evidence indicating good construction and satisfactory performance was obtained from sources acceptable to the Council.

Maico Transist-Ear Hearing Aid, Model O: The Maico Company, Inc., 21 N. Third St., Minneapolis 1.

The Maico Transist-Ear Hearing Aid, Model O, is a tube-less instrument employing three transistors. The power is furnished by

a single 1.5 volt cell of the mercury type. The body of the instrument measures 46 by 64 by 16 mm. and, without battery and receiver attachments, weighs 84 gm. The battery weighs 14 gm., the receiver with its cord weighs 11 gm., making the total weight 109 gm.

The Council obtained evidence indicating that this device was soundly constructed and satisfactory in operation.

Hydromassage Subaqua Therapy Unit, Model HM 1100: Ille Electric Corporation, 50 Mill Rd., Freeport, Long Island, N.Y.

The Hydromassage Subaqua Therapy Unit, Model HM 1100, also referred to as the Combination Hydromassage Treatment and Wading Tank, is a large unit intended to be installed permanently, with connections to the plumbing, in a department of hydrotherapy.

The complete unit consists of a stainless steel tank with a wading trough, adjustable hand rails, stainless steel steps, and body suspension wading harness. Included also are a water stretcher with cross bar and suspensions, canvas body sling, body hammock, head rest and plinth, miscellaneous tank fittings, dial thermometer, thermostatic water mixing valve assembly, two electric turbine ejectors, two turbine ejector carriages, and two turbine ejector elevators. The ejectors require 60 cycle alternating current at 115 volts and draws 1,150 watts.

The apparatus is shipped in two parts: the larger measures 150 by 290 by 213 cm. (60 by 114 by 84 in.) and weighs 680 kg. (1,500 lb.), and the smaller measures 137 by 63 by 63 cm. (54 by 25 by 25 in.) and weighs 227 kg. (500 lb.).

Evidence indicating satisfactory construction and operation was obtained from sources acceptable to the Council.

Telex Hearing Aid, Model 954: Telex, Inc., Telex Park, St. Paul 1, Minn.

The Telex Hearing Aid, Model 954, contains two vacuum tubes and one transistor. It requires one 1.25 volt A-battery and one 30 volt B-battery. Excluding the minor projections, it measures 90 by 44 by 18 mm. The main portion of the instrument weighs 102 gm. The batteries weigh 49 gm., and the earphone with its cord weighs 20 gm., making a total of 171 gm. The Council obtained evidence indicating sound construction and satisfactory performance.

Kegel Perineometer: Perineometer Research Laboratory, Inc., 2007 Wilshire Blvd., Los Angeles 5, Calif.

The Kegel Perineometer is an apparatus for indicating the strength of contraction of certain pelvic and perineal muscles. The apparatus, by providing a wide range of resistances to the contracting muscles, is use-

ful in the training and strengthening of these muscles. It consists of two parts: one is for insertion into the vagina, and the other is an aneroid manometer with a dial reading from zero to 100 mm. Hg. The two parts are connected by a rubber tube.

The part designed for vaginal insertion is made of rubber and shaped roughly like the finger of a glove. It is held rigid by a metal axis that projects to a height of about 9 cm. at right angles from the center of a circular disk that is about 7.5 cm. in diameter. When the rubber chamber is squeezed, the pressure is transmitted through the rubber tube to the manometer and the pressure is easily read.

The apparatus is contained in a case measuring 17 by 9 by 8 cm. (6½ by 3½ by 3¼ in.) and weighing 425 gm. (1 lb.). The shipping weight is 600 gm. (1¼ lb.).

Evidence obtained from sources acceptable to the Council showed that the device was well made and useful for the purpose for which it was intended.

Otarion Hearing Aid, Model B-30: Otariion, Inc., 4757 Ravenswood Ave., Chicago 40.

The Otariion Hearing Aid, Model B-30, uses three vacuum tubes, one 1.25 volt A-battery, and one 30 volt B-battery. The body of the instrument measures 80 by 45 by 23 mm. and weighs 82.5 gm. The batteries weigh 40 gm., and with earphone and receiver cord the total weight is 134 gm. This model is larger, heavier, and more powerful than the Otariion Hearing Aid, Model B-15.

Evidence indicating satisfactory construction and performance was obtained by the Council.

Fortiphone Hearing Aid, Model 22: Fortiphone Limited, Fortiphone House, 247 Regent St., London, W.1, England.

Distributor: Anton Heilman, 75 Madison Ave., New York 16.

The Fortiphone Hearing Aid, Model 22, uses three vacuum tubes, one 1.5 volt mercury type A-battery, and one 30 volt B-battery. The body of the instrument measures 80 by 48 by 20 mm. and weighs, with batteries, 155 gm.

The Council secured evidence from acceptable sources indicating that the workmanship of the instrument was sound and that its performance was satisfactory.

Sonotone Hearing Aid, Model 977: Sonotone Corporation, Elmsford, N. Y.

The Sonotone Hearing Aid, Model 977, is a three tube instrument powered by one A-battery (1.5 volt mercury) and one B-battery (30 volt zinc-carbon). This instrument may also be used with a 22 volt B-battery and an adapter, as an alternative to the 30 volt battery. A choice of five receivers is offered. The total weight of the

instrument with batteries, receiver cord, and receiver depends on this choice and ranges from 175.6 to 188.2 gm.

The instrument has a feature referred to either as a "self-control" noise suppressor, or automatic volume control (AVC). This volume-limiting control limits the maximum level of output to a choice of one of three levels regardless of the input.

Evidence from acceptable sources indicated that the instrument was satisfactory in construction and operation.

Technicon-Huxley Chest-Abdomen Respirator Pump and Cuirasses: Conitech, Ltd., 215 E. 149th St., New York 51, N. Y.

The Technicon-Huxley Chest-Abdomen Respirator Pump and Cuirasses are intended for use in artificial respiration, particularly in poliomyelitis. The assembly consists of a set of four cuirasses, a power unit mounted on casters, and a flexible pipe or hose. The four cuirasses represent a range of sizes from child to adult. The edges of the cuirasses, which maintain air-tight contact with the patient's skin, are made of a spongy material resembling foam rubber. The pump is electrically driven, requires 60 cycle alternating current at 110 volts, and draws 175 watts.

The respirator is shipped in two crates, measuring 76 by 46 by 46 cm. (30¼ by 18½ by 18½ in.) for the power unit and 64 by 45 by 69 cm. (25½ by 18 by 27½ in.) for the cuirasses. The former weighs 50 kg. (110 lb.); the latter, 23 kg. (50 lb.). Unpacked, the power unit measures 60 by 39 by 40 cm. (24 by 15½ by 16 in.) and weighs 43 kg. (95 lb.).

The frequency can be adjusted between 12 and 26 respirations per minute. The stroke

volume is about 1,100 cc. Negative pressure can be controlled up to 40 cm. water; positive pressure can also be applied.

Evidence indicating sound construction and satisfactory operation was obtained from sources acceptable to the Council.

Sonotone Hearing Aid, Model 1010: Sonotone Corporation, Elmsford, N. Y.

The Sonotone Hearing Aid, Model 1010, has two vacuum tubes, one transistor, a 1.25 volt A-battery, and a 15 volt B-battery. The body of the instrument, which is extremely thin, measures 76 by 43 by 15 mm. and weighs 75 gm. The two batteries weigh 23 gm., and the earphone with receiver cord weighs 11 gm., bringing the total weight to 109 gm. The Council obtained evidence indicating satisfactory construction and operation.

Normatone Hearing Aid, Model D-53: Johnston Hearing Aid Mfg. Co., 708 W. 40th St., Minneapolis 8.

Distributor: Normatone Hearing Aid Company, 22 E. Seventh St., St. Paul 1.

The Normatone Hearing Aid, Model D-53, has three vacuum tubes and is powered by two zinc-carbon batteries: an A-battery supplying 1.5 volts, and a B-battery supplying 22.5 volts. The body of the instrument is enclosed in a case made of a thermo-plastic substance, measures 83 by 57 by 20 mm., and weighs 81 gm. With earphone, receiver cord, and the two batteries the total weight is 141 gm. There is no adjustable tone control and the volume control includes the off-on switch.

The Council obtained evidence indicative of satisfactory construction and operation.

AMERICAN CONGRESS OF PHYSICAL MEDICINE AND REHABILITATION

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PHYSICAL MEDICINE ABSTRACTS

Complications in Replacement Arthroplasty of the Hip. Howard A. Mendelsohn, and Seymour L. Alban.

J. Bone & Joint Surg. 36-A:29 (Jan.) 1954.

The operation known as replacement arthroplasty of the hip is enjoying a popularity rarely accorded a surgical procedure which has not passed the test of time. Despite allegations to the contrary, substitution of a portion of the hip joint by a prosthetic appliance is a surgical procedure of some magnitude, and is inevitably attended by a variety of complications.

This study includes forty patients having a total of forty-five replacement arthroplasties of the hip. Most of these patients were operated upon at Wadsworth General Hospital, Veterans Administration Center, Los Angeles, California. The operations were performed by a number of surgeons on the staff of the hospital. The ages varied from twenty-five to eighty-three years. Thirteen were females and twenty-seven were males. Thirty-nine of the prostheses were of Judet type, five were of the Eicher variety, and one was of the Jaenichen-Collision type. Four of the patients underwent bilateral operations. There was a total of six deaths.

Five postoperative dislocations (eleven per cent), all of the anterosuperior type, occurred in this series. Four dislocations occurred in patients who had Judet prostheses and one in a patient with an Eicher appliance.

Superior subluxation was noted in ten cases (twenty-two per cent). This condition is characterized by a migration of the proximal portion of the femur superiorly and often centrally producing what appears to be a subluxation of the head of the prosthesis. Nine patients (twenty per cent) in this series presented roentgenographic evidence of calcification in the soft tissues adjacent to the hip joint.

Fractures of the femur and stem protrusion occurred in the series of five Eicher-replacement arthroplasties. Varus deformity occurred postoperatively in two cases of Judet arthroplasty.

In the final analysis, relief from pain is the most important postoperative consideration. In this series of forty patients, thirteen

complained of persistent pain of a moderate to a severe degree from three to sixteen months after operation.

Lumbar Sympathectomy in the Treatment of Peripheral Vascular Diseases. Louis T. Palumbo; Lloyd F. Quirin, and Russell W. Conkling.

Surg., Gynec. & Obst. 96:162 (Feb.) 1953.

The value of lumbar sympathectomy in the treatment of peripheral vascular diseases is now being recognized and accepted because of the encouraging results which are based upon the release of vasospasm and the development of small collateral vascular channels in the involved extremities. The resulting increase in the circulation provides the extremity with more oxygen and nutrients and removes the waste products from the tissues. As a result, the patient experiences relief of pain, the edema improves, the extremity becomes warm and dry, ulcers and other lesions heal more rapidly, and in those who require a major or minor amputation, it can be accomplished at a lower level.

This report is an evaluation of the results of lumbar sympathectomy in a variety of conditions or diseases affecting the peripheral vessels of the lower extremities. The study involves 159 male patients upon whom 221 lumbar sympathectomies were performed from October 1946 to December 1951. Follow-up studies were obtained at various intervals postoperatively. In 41, or 25.7 per cent of this group, the operation was performed on the right side; in 56 (35.8 per cent), the operation was performed on the left; and in 62, or 38.5 per cent of the patients, the operation was performed bilaterally. In three of these patients the bilateral procedure was accomplished on the same day, whereas in the remaining group, the second procedure on the opposite side was performed usually between the seventh and the fourteenth days.

The patients were classified into the following categories: arteriosclerosis (including diabetes); arterial emboli, aneurysm or thrombosis; thromboangiitis obliterans (Buerger's disease); freezing, immersion foot and causalgia; thrombophlebitis, chronic; varicose or chronic leg ulcer; and peripheral

vascular diseases of undetermined causes or types.

The results of the entire series were considered good to excellent in sixty-five per cent and fair in twenty-eight per cent. The greatest number of patients who were benefited by the procedure were those with Buerger's disease, varicose or chronic leg ulcers, and those who had freezing, immersion foot or causalgia. The patients who had arteriosclerotic disease of the peripheral vessels, even though their average age was greater than groups mentioned, revealed results which were considered good to excellent in sixty per cent of the cases.

Thirty-four per cent of the patients with chronic thrombophlebitis obtained good to excellent results following sympathectomy. In addition, forty-eight per cent were slightly improved following surgery.

The complication rate was less than ten per cent in the entire series.

Ultrasonic Energy in Physical Medicine. Guy H. Fisk.

Canad. M.A.J. 69:533 (Nov.) 1953.

Excessive curative powers have been attributed to ultrasonation in treatment of many conditions. In an attempt to obtain an unbiased impression of its efficacy, ultrasonic therapy was prescribed in unselected cases as the treatment schedule permitted and as they were seen routinely, in the clinic of Physical Medicine of the Montreal General Hospital. These patients would ordinarily have received some form of diathermy. In conjunction with the ultrasonic therapy, the usual appropriate exercises were given. No attempt was made to impress the patient. Nothing sensational was noted in the treatment results. The results obtained did not indicate that the use of the apparatus was of more value than the use of a standard short wave diathermy machine. It is granted that the study was conducted in a small department. However, it is pointed out that in a large department the machine would be of value only in the few cases that do not respond to other forms of treatment. In general, the ultrasonic apparatus was considered less versatile than were short wave diathermy machines.

In conclusion, it was stated that use of an ultrasonic machine is no substitute for a good physical therapist with well-trained hands; and that ultrasonation is of little value in the treatment of radiculitis due to degeneration of intervertebral disks, the pain of nerve irritation, and metastatic involvement of nerves.

Restoration of Knee Joint Function in Chronic Rheumatoid Arthritis. Robert L. Preston.

Ann. Rheumat. Dis. 12:290 (Dec.) 1953.
It has been customary to fuse severely

deformed knee joints in chronic rheumatoid arthritis. Since cortisone and ACTH have been used, the outlook is more favorable. Clinical studies indicate that it is now feasible to perform operations on these knee joints sufficiently extensive to correct the principal pathological findings. In such instances, there is reasonable assurance that the rheumatoid inflammation will be controlled, postoperative scar formation and edema will be inhibited, and postoperative pain will be minimized. Use of cortisone or ACTH makes it easier for the patient to co-operate in the postoperative program, which is necessary to complete the functional rehabilitation.

The prolonged overlength position of the extensor motor apparatus of the knee due to the flexion contracture often constitutes a serious handicap in the restoration of active control of extension. This difficulty is in addition to the extensive muscular atrophy accompanying such a condition. The author modifies the technic of the posterior capsulotomy operation of Wilson.

Studies in Experimental Frost-bite. Evaluation of Rutin in Prophylaxis and Treatment of Frost-bite in the Mouse Resulting from Exposure to Low Ambient Temperature. A. W. Kunkler, and H. B. Shumacker, Jr.

Angiology 5:11 (Feb.) 1954.

The demonstration that rutin and other flavanoids have some effectiveness in reducing tissue necrosis resulting from experimental frost-bite in certain animals, has raised the question whether such drugs would be of prophylactic or therapeutic value in the management of local injuries in man due to cold. In previous experiments, an animal's foot, tail, or ear was immersed in a freezing mixture. This paper concerns exposure of the entire animal to a low ambient temperature. The experiments revealed no demonstrable value of rutin either when given one week before exposure or when given two days before and one week after exposure to cold. The number of animals dying during the exposure was greater in the groups treated with rutin than in the control group. It seems doubtful that the use of flavanoids in man will be valuable.

The Offset Trochanteric Joint in Braces for the Lower Extremities. Odon F. von Werssowetz.

J. Bone & Joint Surg. 36-A:165 (Jan.) 1954.

In braces for paraplegics who require the addition of a pelvic band for stabilization of the hips, a free trochanteric joint is not used routinely because it does not provide sufficient support and consequently causes postural malalignment. To prevent this undesired condition, an offset trochanteric joint may be used successfully.

The basic principle of an offset joint is the placing of its axis on one side of the load line and the weight-bearing force on the other. This provides a simple mechanical advantage by producing a locking force on weight-bearing. The effect is increased stability.

The offset trochanteric joint is constructed of two curved bars with the hinge offset approximately one half-inch anterior to the front of the bar. Hyperextension is blocked and controlled by a metal stop welded to the inner surface of the upper curved bar. Motion anterior to the line of gravity (flexion) is free. In this way, stability on locomotion is assured, yet free mobility of the joint is preserved.

Used in patients with moderately severe weakness of the pelvic girdle and lower abdominal muscles, the offset trochanteric joints permit the patient to walk more naturally with a much improved gait pattern compared to that ordinarily seen in patients wearing a brace equipped with either free or locked hip hinges.

Flaccid Quadriplegia Associated with Hyperpotassaemia. G. O. Richardson, and J. C. Sibley.

Canad. M.A.J. 69:504 (Nov.) 1953.

It is well known that potassium is a potentially toxic substance. There is no pathognomonic picture. The condition has often been recognized by certain characteristics of the electrocardiographic tracing. This paper discusses two cases of hyperpotassaemia associated with rapidly progressive quadriplegia. The etiology of the paralysis is not clear. In severe dehydration and sodium loss, a shift of interstitial and finally of intracellular potassium into the blood stream takes place. Potassium intoxication is therefore likely to occur if there is deficient renal function with oliguria, or other abnormal metabolic conditions. So far, administration of insulin and glucose is the most effective treatment for hyperpotassaemia, provided the use of insulin is not contraindicated. If present, acidosis and lowered serum sodium increase the toxic effects of potassium and require correction.

Hemifacial Spasm: An Affection of the Facial Nerve. M. C. O'Donnell.

Ann. Otol. Rhin. & Laryng. 62:969 (Dec.) 1953.

Hemifacial spasm is a condition manifesting itself by clonic and occasionally tonic contractions of the musculature innervated by the facial nerve. This usually begins in the orbicularis oculi muscle. The spasm may occur during sleep. It is worse under stress or strain and it may occur with tic douloureux. The cryptogenic type is irregular and involuntary; the secondary type is less severe and follows organic causes such as aneurysm

of the basilar artery, or tumor of the petrous ridge, or encephalitis. Nonsurgical treatment has included sedation, vasodilators, and intravenous procaine. It would seem logical to block the stellate ganglion in an early case.

Since nonsurgical treatment has contributed little, one must resort to surgery as the method of choice. Nerve section of a peripheral branch of the facial nerve, and neurolysis of the facial nerve are suggested. The sequelae must be explained to the patient. Many patients prefer a facial paralysis to the severe, paroxysmal contractions.

Microwave Diathermy and the Healing of Experimentally Produced Fractures in Rabbits. Edward D. Henderson; Warren A. Bennett, and J. F. Herrick.

J. Bone & Joint Surg. 36-A:64 (Jan.) 1954.

Numerous investigators have demonstrated that the lack of vitamins, minerals, hormones and special diets may delay healing of bone. However, it has never been conclusively shown that any of these substances can increase the normal rate of healing of fractures. It seems, therefore, that chemical environment has only a negative effect at the fracture site. Less is known of the effect of physical environment on the healing of fractures. Since the application of heat to an area ordinarily increases blood flow, it is theoretically possible that heat in the correct dosage might accelerate the healing of fractures. In 1939, Speed and Fell showed that fractured bones of guinea pigs healed better under the effect of continuously elevated temperature in the fractured extremity when compared with the healing of homologous fractured limbs which were not exposed to continuous heat. Sweeney and Laurens, in 1935, reported the effect of carbon-arc radiation on the healing time of fractured bones of rats and dogs. It was their impression that the wavelength of the radiations had definite effect on the results. The sunshine carbon radiation accelerated healing while the therapeutic c - carbon radiation retarded it. Wise, Castleman and Watkins reported that a single heavy dose of microwave radiation on long bones of albino rats retarded the growth of bone and in some instances destroyed the bone and soft tissues.

The purpose of this experiment was to determine whether the heat of microwave diathermy applied locally to the fracture site, without other treatment, influences the rate or quality of healing of fractures. Adult rabbits were used, fractures were produced surgically and clinical conditions were maintained throughout the experiment.

A preliminary experiment was performed to determine the dosage of microwave energy which would raise the temperature in the medullary cavity of the ulna in intact rabbits to 40 C. from the resting level of 34.4 to 35.6 C. without a rise in rectal temperature. The temperature was measured by means of ther-

mistors inserted in holes which had been drilled into the cortex of the ulna. Thermistors were used because they can be left in situ during microwave radiation without secondary heating effects caused by electric currents which may be present when the thermocouples are used. With a current of 25 milliamperes and C director at a distance of two inches from the surface to be heated, the dosage was found to be 30 minutes. This dosage and specifications were used throughout the experiment.

Fractures were produced in the shafts of both ulnae of seventeen rabbits. The exact positions of the fractures were determined by roentgenograms and by actual physical measurements. The fracture site of the left ulna of each of the seventeen rabbits was exposed to microwaves with the same dosage and specifications, as determined in the preliminary experiment, eleven times per week. The right ulna was used as a control. For obvious reasons, three of the rabbits were excluded from the experiment. Of the remaining, one was killed at the end of the first week, eight at two weeks and five at three weeks. Later, five more rabbits were treated in a like manner but the current was increased to thirty five milliamperes and the animals were killed seventeen days after production of the fractures.

Gross, roentgenographic and microscopic examinations failed to reveal any evidence that healing was of better quality or took more rapidly on one side as compared with the other. The microscopic examinations were made by the pathologist who had no prior knowledge which legs had been treated.

In the evidence presented in this experiment, there are no conclusive or consistent facts which show that this amount of heat has affected healing of fractures either favorably or adversely in its early stages. The evidence, of course, does not shed any light on what would have happened if the heat treatments which were given twice a day had been continued until full consolidation of the fractures had taken place and it does not show what would have happened if the fractures had been allowed to consolidate after two or three weeks of daily radiation.

Roentgenographic Examination of the Lumbosacral Spine in Routine Pre-Employment Examinations. Carl F. Runge.

J. Bone & Joint Surg. 36-A:75 (Jan.) 1954.

For many years it has been a universal experience in industrial and compensation medical practice that one of the most costly disabilities, as well as a disability resulting in great loss of time, is low-back strain and its variations and sequelae.

A survey was begun January 1, 1951, and ended December 31, 1952. The advantages in making such a survey include the reduction of

losses from a compensation point of view by

refusing employment to persons to whom a company has no obligation by virtue of previous employment and who have spine defects, which represent a definite risk of future claims. It is also an advantage, in the case of those persons to whom an employment obligation exists, to have a record of pre-existing spine defects in case of future injury. In the cases of persons who are employed with spine defects, the pre-employment examination allows the intelligent assignment of positions which involve less risk or otherwise limit activity. From the individual's point of view, it has been possible to advise those who were refused employment because of spine defects that it would be safer for them to seek employment of a less arduous nature.

The findings in 4,654 roentgen examinations of the lumbosacral spine in routine pre-employment examinations were made. Defects which were demonstrable by roentgenogram were found in 1,174 applicants or 25.44 per cent of the persons examined. Approximately ten per cent of the applicants were rejected for employment because of spine defects. It is necessary and desirable to accept for employment a certain number of persons with defects of the spine because of the seniority established by prior employment. A program is not a panacea for the problem of compensation claims due to injury or strain of the back. Many injuries will occur in heavy industry to backs not previously the seat of structural defects. However, it is felt that the program will eliminate a number of claims which are based primarily on structural defects. In addition, in the case of those applicants accepted with defects, a record of pre-existing defects will be useful when it is alleged that subsequent injuries are the cause of defects found.

Rehabilitation of the Tuberculous. Jacob Goldberg, and Bernard Berner.

Dis. Chest 24:571 (Nov.) 1953.

Physicians treating tuberculosis are becoming increasingly aware that for many patients definitive medical and surgical care alone is not sufficient for total rehabilitation. Since so many emotional, social and economic factors complicate long term medical care, attention to all aspects of treatment is essential for most effective results. To stimulate further interest in the rehabilitation of the tuberculous, the authors were prompted to make a study of a group of ambulatory patients during the final months of their hospitalization when the disease was becoming inactive and they were increasing their physical activity.

During a two year period, fifty-seven patients were studied. They were selected at random from the pre-discharge ward. Their disease on admission to the hospital was either moderately or far-advanced. After a period of effective treatment on the infirmary and semi-infirmity wards, their disease be-

came inactive so that these patients were transferred to the pre-discharge ward. All had a prescribed work capacity of at least two hours, exclusive of activity involved in self-care and recreational activities.

The in-hospital program includes activities in the Physical Medicine and Rehabilitation Service as well as individual and group counseling given by the ancillary services and vocational adviser. This Service consists of four sections: Manual Arts Therapy, Educational Therapy, Physical Therapy and Occupational Therapy.

The supervising physician decides on the amount of work each patient is able to do, based on the combined information obtained from several sources. The latter include the study of serial chest x-ray films and results of sputa tests as well as the recorded observations made by the therapists and ward nurse. The patient's personality and intellectual make-up, as well as any co-existing non-pulmonary disorders, are also noted. If there are no ill-effects from the current prescribed activities, the work prescription is increased one hour each month. As a rule, most of the patients have a four hour work capacity level by the time they are ready for hospital discharge.

Patients meet regularly with the staff psychologist. Bi-weekly group therapy sessions serve a two-fold purpose; patients are encouraged to talk freely on any subject they choose to discuss, and they discover that

others in the group have difficulties similar to their own.

The hospital social worker plays an important part as a member of the rehabilitation team. Her role is to evaluate the patients, on an individual basis, listen to any of their unresolved problems and to help them deal with these problems in practical ways.

The vocational guidance of patients is an essential rehabilitation complement to the medical, social and psychological phases of the program. He plays an important role in helping the patient to "adjust to a post-hospital world" and conducts informal discussions one hour each week. The vocational adviser conducts field trips for patients to nearby factories. The main purpose of the visits is to show the wide variety of employment opportunities available to ex-patients in the business establishments.

As a result of the beneficial effects from the use of chemotherapy and antibiotics alone or combined with chest surgery, the disease has often been brought under control much sooner, thereby shortening the period of disability and hospitalization. Clinical improvement has proceeded at a faster rate, so that such patients are referred to the Rehabilitation Service earlier than before. These newer methods of treatment combined with the planned rehabilitation efforts have made it possible for fully recovered patients to return sooner to their family and community with good prospects of eventual employment.

BOOK REVIEWS

The reviews here published have been prepared by competent authorities and do not necessarily represent the opinions of the American Congress of Physical Medicine and Rehabilitation and/or the American Society of Physical Medicine and Rehabilitation.

MANAGING YOUR CORONARY. By William A. Brams, M.D. Cloth. Price, \$2.95. Pp. 158, with illustrations by Hertha Furth. J. B. Lippincott Company, 227 S. Sixth St., Philadelphia 5, 1953.

The need for a book of this kind is doubtful. Detailed knowledge of coronary disease on the part of the patient is not important in intelligent treatment in the way that careful instruction of the diabetic patient is essential. Furthermore, complete agreement regarding the treatment of acute myocardial infarction does not exist among cardiologists, so that some of the information in this volume might confuse the patient relative to the quality and rationale of his medical care. In-

struction of the patient and the treatment of the disease should be the responsibility of the physician in charge.

On the whole, the factual information presented is accurate, though some minor differences of opinion could be expressed.

WHEN YOU MARRY. By Evelyn Millis Duvall, Ph.D., and Reuben Hill, Ph.D. With chapters in collaboration with Sylvanus M. Duvall, Ph.D. Revised edition. Cloth. Price, \$3.75. Pp. 466, with illustrations. Association Press, 291 Broadway, New York 7, 1953.

After reading the new and revised edition of this publication, one wonders if there were a real need for this type of book. In over

400 pages of text, the only two chapters of any import are the chapters on the "Facts and Feelings About Divorce" and "Common Conflicts in Marriage." A chapter entitled "Where Babies Come From" and a paragraph on "How Babies Are Made" leaves one in a complete sense of surprise relative to the approach on this subject.

It is evident that a good deal of time has been put into the preparation of this book. Each chapter is concluded with a selected readings and technical references section. The book is also liberally sprinkled with cartoons taken from publications such as *The Saturday Evening Post*, *New Yorker Magazine*, and the like.

POLIOMYELITIS. By *W. Ritchie Russell*, C.B.E., M.D.(Edin.), M.A.(Oxon), F.R.C.P.(Edin.), F.R.C.P.(Lond.) Consultant Neurologist to the United Oxford Hospitals, Consultant Neurologist to the Army, Consultant Neurologist to the Ministry of Pensions, Clinical Lecturer in Neurology, University of Oxford. Cloth. Price, \$3.00. Pp. 84, with illustrations. The Williams & Wilkins Co., Mount Royal and Guilford Aves., Baltimore; Edward Arnold & Co., 41-43 Maddox St., London, W.1, 1952.

This very short book is a straight forward account of various features of polio and the fundamentals of its treatment. A sympathetic understanding of a patient in a respirator and few hints on weaning a patient from the respirator are given. Numerous quotations could be given but the following two are evidence of the soundness of the author's ideas: "No reason to suppose that the life of a single nerve cell has ever been saved by the use of hot packs" and "excessively long periods of hospital treatment disturb the patient's plan of life to such a degree that the pros and cons should be carefully balanced according to the individual's circumstances. The psychological reaction of both the patient and his relatives requires careful consideration, and plans for the future should be discussed as soon as the likely degree of permanent disability can be assessed."

This work provides information that is concise, up-to-date and helpful. Most Americans would agree with these concepts as expressed by one of our English colleagues.

TRIUMPH OF LOVE. An Unforgettable Story of the Power of Goodness. By *Leona S. Bruckner*. Cloth. Price, \$3.00. Pp. 213. Simon and Schuster, Inc., Publishers, Rockefeller Center, 630 Fifth Avenue, New York 20, 1954.

A heart-warming story told by the mother of a child born without arms. The fears, anxiety and inner-thoughts of both parents are related from the first time the child is seen to the time he is brought home to stay. Being written by a lay person, the language

is simple and readily understood. The work of Doctors Arthur Abramson and Henry Kessler in the field of rehabilitation is praised highly. The book is recommended to expectant parents.

STRESS AND DISEASE. By *Harold G. Wolff*, M.D., Professor of Medicine (Neurology), Cornell University Medical College. New York. Publication number 166, American Lecture Series, monograph in Bannerstone Division of American Lectures in Physiology. Edited by *Robert F. Pitts*, M.D., Ph.D., Professor of Physiology and Biophysics, Cornell University Medical College. Cloth. Price, \$5.50. Pp. 199, with 38 illustrations. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill.; Blackwell Scientific Publications, Ltd., 49 Broad St., Oxford, England; Ryerson Press, 299 Queen St. W., Toronto 2B, 1953.

This is an easily read book which will hold the interest of persons in any branch of medicine. The author states that "the common knowledge that man gets sick when life's circumstances are adverse, and is healthy when they are propitious, has been extended by precise measurements of bodily functions before, during, and after periods of stress." Many graphic illustrations of physiological changes in many individuals during emotional upsets are included in this book in an effort to show that the impact of man on man may be as traumatic as that of invading microorganisms or applied physical forces. One example of the studies made by Dr. Wolff is his comparison of the rapid changes in the color of the mucosa and the contractile state of the exposed colon which occur during anger, reassurance, and discussion of stressful and humiliating topics. This work is recommended to those who wish to gain insight into the part stress may play in causing human disease.

AMERICAN POCKET MEDICAL DICTIONARY. A Dictionary of the Principal Terms Used in Medicine, Nursing, Pharmacy, Dentistry Veterinary Science, and Allied Biological Subjects. New, 19th edition. Leatherette. Price, \$3.25 Plain; \$3.75 with Thumb-Index. Pp. 639. W. B. Saunders Company, 218 W. Washington Square, Philadelphia 5, 1953.

This is the new and revised nineteenth edition of this particular dictionary. The publisher states this is a "Dictionary of the principal terms used in Medicine, Nursing, Pharmacy, Dentistry, Veterinary Science, and Allied Biological Subjects." It is not as extensive as the standard medical dictionary, but it was not designed to supplant these publications. Its size, however, does not detract from its usefulness. The physical make-

up of the book is attractive. It is easy to read and use. This publication fills a long-time need for a pocket-size dictionary.

PHYSIOLOGY OF MUSCULAR ACTIVITY. Originally by *Edward C. Schneider*, M.P.E., Ph.D., D.Sc. Fourth edition, by *Peter V. Karpovich*, M.P.E., M.D., Professor of Physiology, Springfield College, Springfield, Mass. Cloth. Price, \$4.75. Pp. 340, with 77 illustrations. W. B. Saunders Company, 218 W. Washington Sq., Philadelphia 5; 7 Grape St., Shaftesbury Ave., London, W.C.2, 1953.

This book is the fourth edition of the book written by Edward C. Schneider. Dr. Schneider was unable to cooperate in the revisions, so the author has assumed the responsibility for all shortcomings.

The book is written for students of physical education who have had some acquaintance with physics, chemistry, anatomy, and physiology. The text takes a wide latitude in interpretation of what that acquaintance is. Some parts are very rudimentary and some are based on a thorough understanding of certain basic concepts and fundamentals of physiology and biochemistry.

While a few passages are devoted here and there to muscular activity in disease, the greater portion of the material deals with physiologic responses in normal healthy individuals and/or athletes.

The material in the first part of the book is devoted to the reactions and physiology of the various bodily systems to exercise, and how they are affected. The last part of the text is devoted to other factors influencing muscular performance and to the effect of exercise on health and health on exercise.

The author has tried hard to awaken in physical educators the difference between scientific facts and just plain fads or superstition. For this he should be highly commended, although on several occasions, he has made pointed remarks on rather precarious data.

On the whole the book is interesting, although few grammatical errors appear and some proof reader was unacquainted with the proper spelling of Joe Louis.

A HANDBOOK OF DISEASES OF THE SKIN. By *Herbert O. Mackey*, F.R.C.S.I., L.R.C.P.I., D.P.H. Cloth. Price, 7s. 6d. Pp. 216, with 36 illustrations. C. J. Fallon, Ltd., 43 Parkgate St., Dublin, 1952.

This book is intended primarily for students as a practical guide to the clinical study and treatment of diseases of the skin. It is a pocket-sized edition which students, interns, and practitioners should find convenient and useful. The preliminary chapters which include anatomy, pathology, general symptomatology, etiology, external, and

internal treatment, contain a wealth of well presented instructive material. The formulae includes many time-honored prescriptions. It is surprising that Dr. Mackey's white lotion is equivalent to only $\frac{1}{4}$ strength white lotion NF, when most dermatologists find it necessary to use double and even quadruple strength for therapeutic effect.

Considering the limitations imposed upon a compendium, the description of many dermatologic entities is excellent. The chapter on industrial dermatitis is particularly commendable. It is unfortunate that certain important diseases as lupus erythematosus had to be limited to no more than passing mention. The many good photographs should be relocated to coincide with the text.

It is noteworthy that many advances in the medical management of skin disease have occurred since the submission of Dr. Mackey's manuscript and it is hoped that these will be incorporated in a new edition to enhance the value of this handbook. These include the use of cortisone and corticotropin, isonicotinic acid derivatives, the newer antibiotics, Vitamin B12, quinacrine hydrochloride, chloroquine phosphate, and others. Moreover the high sensitizing index of penicillin ointment and of sulfathiazole and sulfadiazine ointment should be stressed and their local use discouraged in future publication.

DER ULTRASCHALL UND SEINE ANWENDUNG IN WISSENSCHAFT UND TECHNIK. By *Dr. Ludwig Bergmann*, Professor für Physik. Fifth edition. Cloth. Price, \$12.50. Pp. 748, with 460 illustrations. S. Hirzel Verlag, Zurich, 1949.

The historic progress of physical medicine is replete with evidence of the lag of recognition of discoveries because they were too far ahead of their time. Typically of this state has been the evolution of knowledge pertaining to the nature and action of ultrasonics from its initial presentation by the illustrious Curies in 1880, to its recent crystallization into an important chapter of medical and industrial practice that virtually required an interim of 60 years of assiduous study to raise its scope to the quality of a new three dimensional discipline. Of the formal contributions now extant on the subject, one may in particular affirm the laudatory expressions evoked by previous editions of Bergmann's text as a preface to one's present impressions of the superlative quality of the revised and voluminous 5th edition under consideration.

The book is a comprehensive and well organized technical exposition of practically every quantitative facet known to be related to the subject of ultrasonics. Within this erudite frame, the author reviews the amazing and extensive progress of sonic radiation known to science, i.e., from its earliest

mechanical inception to its most recent and flexible development, including the piezoelectric effect on living and inert material of various densities and composition. Of special interest to the profession is chapter 5, which in its massiveness not only approaches the girth of a monograph of nearly 200 pages, but offers an illuminating and richly documented exposition on problems relevant to the medical interpretation of the dynamics related to the thermomechanical sonic forces released and absorbed on simple and complex structures ranging in magnitude from the submicroscopic to the macroscopic. Included therein are sections dealing with the effect of ultrasonics on colloid structure, with particular reference to its dispersive action causing emulsifications, the splitting of high polymer molecules, and the spectacular phenomena of peptization. Succeeding sections discuss the effects of the chemical and biochemical action through sonic radiation, with special discussion on its associated thermogenetic role leading to coagulation, cavitation and degassing effects.

The concluding section of this massive chapter of an opus, which can well be described as encyclopedic, closes on the theme of sonic action in biologic and medical problems. It touches with considerable detail and data the effect of ultrasound waves on large, small and minute animal life, on microorganisms, enzymes and plant life, ending in an optimistic note of progress in medicine. The author being a physicist of high distinction logically left the discussions of medical advances at the door of the medical profession. Appended is an amazing bibliography of 2,322 highly scientific contributions which is concluded with a well balanced and detailed index. This volume deserves to be listed among the permanent and substantial contributions in our discipline. It is replete with the richest sources of evidence, thus transforming its content into a three dimensional perspective of depth, height and unquestioned timeliness. The author and publishers are to be congratulated for a contribution that touches the superlative key.

ADVANCES IN BIOLOGICAL AND MEDICAL PHYSICS. Volume III. Edited by *John H. Lawrence* and *C. A. Tobias*. Cloth. Price, \$8.00. Pp. 368. Academic Press, Inc., 125 E. 23rd St., New York 10, 1953.

This third volume of a series on Advances in Biological and Medical Physics, which was started in 1948, contains seven chapters, only two of which are devoted to radioactive isotopes. This is in marked contrast to the first two volumes of the series which were almost exclusively devoted to studies with isotopes and which therefore certainly did not justify the all-embracing title. The present two isotope chapters deal with dosimetry (by

Mayneord and Sinclair of the London Royal Cancer Hospital) and with kinetics of biological processes as studied with tracers (by Solomon of the Harvard Medical School). Grabar of the Paris Pasteur Institute gives an excellent presentation of the biological actions of ultrasonic waves with an unusually complete list of references. Kirkpatrick and Pattee of Stanford University describe their interesting work and that of others on x-ray microscopy. A similarly complete description of ultraviolet microscopy and ultraviolet microspectroscopy is offered by Blout of the Harvard Medical School. Two further chapters on "Antibodies as Specific Chemical Reagents," and "Primary Ionization as a Test of Molecular Organization" complete this valuable collection. All chapters are well written and illustrated and contain a large amount of information. The book can be highly recommended.

HYPERTENSIVE DISEASES. Causes and Control. By *Henry A. Schroeder*, M.D., F.A.C.P., Associate Professor of Medicine and Director, Hypertension Division, Department of Internal Medicine, Washington University School of Medicine; Assistant Physician, Barnes Hospital, Saint Louis, Missouri. With contributions from *Gregory S. Gressel*, M.D., *Dean F. Davies*, Ph.D., M.D., *H. Mitchell Perry, Jr.*, M.D., and *Donald F. Gibbs*, M.B., Ch.B., M.R.C.P. (Edin.). Cloth. Price, \$10.00. Pp. 610, with illustrations. Lea & Febiger, Washington Sq., Philadelphia 6, 1953.

This is a fascinating book which is extremely easy to read and which gives one a wealth of information on recent advances in biological chemistry and physiology, as well as a highly attractive theory of the origin of most hypertensive diseases. It is perhaps too early to say that Dr. Schroeder has further demonstrated the correctness of his theory by applying a physiological and pharmacological corrective to the two chief aberrations seen in ordinary idiopathic hypertension. In any case, the author gives adequate attention to nephrogenic hypertension, the endocrine hypertensive syndrome, and some other much rarer conditions.

The basic hypothesis on which the author has pursued his goal has been the concept of a neurogenic factor in a predisposed individual living in our tense, modern civilization and having the appropriate constitutional background. For control of the neurogenic factor he uses the drug hexamethonium chloride, which blocks ganglionic transmission of both the sympathetic and parasympathetic fractions of the autonomic nervous system. He also recognizes that this is treating the neurogenic factor at a distance from its actual origin and that a more causal or anti-causal treatment would be more desirable.

The author further shows that the use of hexamethonium alone is not an adequate control of most hypertensive diseases. He gives sober consideration to the various alternatives and explanations for this fact.

For complete control of essential hypertension, he has further shown that it is necessary to control the nephrogenic factor using 1-hydrazinophthalazine. This drug, which is known by the trade name of Apresoline, inactivates the pressoramine (which Schroeder has named Pherentasin) and which he feels is produced by the kidney as a basically healthy physiological adjustment to insure adequate blood supply. Schroeder calls the combined treatment Hyphex.

The author states that development of the Hyphex treatment is merely a first step and will doubtless be supplanted by improved methods. Some complications of the Hyphex treatment have already been encountered and these need to be kept in mind.

The book is extremely interesting, and perhaps it will have its greatest sale among cardiologists and those concerned particularly with the hypertensive problem. It will quickly become obsolete. It is a refreshing departure from most books of its kind in its readability and also in its persuasive logic. It is an excellent example of the very best kind of medical writing.

WOUNDS OF THE EXTREMITIES IN MILITARY SURGERY. By *Oscar P. Hampton, Jr., M.D., F.A.C.S.*, Instructor in Clinical Orthopedic Surgery, Washington University, School of Medicine, St. Louis. Cloth. Price, \$10.00. Pp. 434, with 131 illustrations. C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, 1951.

The primary purpose of this book is to provide the civilian surgeon with information regarding the care of trauma of the extremities, which occurs during military combat. The material and manner of presentation rather limit the usefulness of this book to physicians in the armed services or those who are about to enter them.

The chapters include discussions of first aid measures and emergency splinting; initial wound surgery, preoperative preparation and transportation splinting; special types of surgery including vascular injuries, compound fractures, wounds of joints, and amputations. Other chapters are devoted to the special consideration of regional injuries, that is, the femur, the foot, the humerus, radius and ulna, and the hand. Consideration is also given to anaerobic wound infections.

The author has added interesting illustrative material from his experiences in the Mediterranean theatre of operations during World War II. The text is well illustrated and the format makes it easy to read. The

physiatrist, although not primarily concerned with the surgical care of war injuries, nevertheless will find this a valuable reference book, for it will help him understand the problems confronting the military surgeon on the battle field and the reasons for the type of surgery employed in various cases. Hence, it will assist the physiatrist in conducting a rehabilitation program for the war-injured patient.

DISABILITY EVALUATION. PRINCIPLES OF TREATMENT OF COMPENSABLE INJURIES. By *Earl D. McBride, B.S., M.D., F.A.C.S.* Assistant Professor in Orthopedic Surgery, University of Oklahoma School of Medicine; Attending Orthopedic Surgeon to St. Anthony's Hospital; Associate Orthopedic Surgeon to Wesley Hospital; Visiting Surgeon to W. J. Bryan School for Crippled Children; Chief of Staff to Bone and Joint Hospital, Oklahoma City, Okla. Fifth edition. Cloth. Price, \$15.00. Pp. 715, with illustrations. J. B. Lippincott Co., East Washington Square, Philadelphia 5, 1953.

It is only five years since the last edition of this work was published. The previous text has been improved. The discussion and scope of partial permanent disability have been enlarged. A rating schedule on the disability of disease has been added and the author has improved the rating schedule to provide a guide to further consideration in each individual case.

Anyone not familiar with this book will find in it information that is most helpful in arriving at the evaluation of a disability. The first part of the book considers the examination of the disabled patient; many practical suggestions are offered to help differentiate various diseases and disorders including hysteria and malingering. This is followed by individual chapters on ankylosis and fractures of the different joints. Chapters are devoted to head injuries, burns, injuries to the eye and ear, and hernia. The last two chapters are entitled: "The Disability of Disease" and "The Employment of the Disabled Person." These chapters contain certain general ideas for placement and a specific list of positions that might be filled by persons with various disabilities.

The author has an insert of 38 pages which comprises a schedule for ratings which is standardized and most complete.

Here is a book that should furnish invaluable reference material to the many physicians who care for individuals disabled by injuries or diseases. Its interest is not limited to industrial or orthopedic surgeons. Physiatrists will find much in this work that will help them evaluate disabilities both objectively and quantitatively.

MODERN RADIOCHEMICAL PRACTICE. By *G. B. Cook*, Ph.D. (Cantab.) and *J. F. Duncan*, D. Phil. (Oxon.) Cloth. Price, \$8.50. Pp. 407, with illustrations. Oxford University Press, 114 Fifth Avenue, New York 11, 1952.

The development of radioactive materials for use in medical and other scientific research in the past few years and the demand for information on this subject have served as a stimulus to the author for the writing of this book. It is written to serve chemists, biologists, physicists, and engineers who employ radioactive technics.

The book does not attempt to go into an exhaustive and detailed discussion of the technics, but, on the other hand, presents the general principles of the use of the application of radioactive substances in research, so that any scientist with a fairly good background in biophysics will find this text a most useful introductory source of information.

The subjects include a section devoted to radiochemistry in which factors affecting radiochemical separations and the use of radioelements in chemical investigations are considered; radiation and radioactive decay in which the laws of radioactive decay, the determination of half-lives, various radioactive materials, and methods of determining the energy of radiations are presented; measurements in nuclear radiation in which ionizing gases, and the measurement of alpha, beta, and gamma radiation, are considered. Sections are also devoted to auxiliary electronic equipment, physical and chemical aspects of radio-isotope production, errors in comparative and absolute counting, health precautions and laboratory design.

There is an interesting section on suggested experiments with radioactive materials. This section is designed to illustrate some of the commonly employed radioactive technics and should be of particular interest to teachers.

ELECTROTHERAPY AND ACTINOTHERAPY: A TEXTBOOK FOR STUDENT PHYSIOTHERAPISTS. By *E. B. Clayton*, M.B., B.Ch., Consulting Physician to Physical Treatment Department, King's College Hospital, London. Second edition. Cloth. Price, \$4.00. Pp. 452, with 127 illustrations. Williams & Wilkins Company, Mount Royal and Guilford Aves., Baltimore 2; Bailliere, Tindall and Cox, 7-8 Henrietta St., Covent Garden, London, W.C.2, 1952.

In this book it is indicated that it is written primarily as a textbook for student "physiotherapists." It is a revision of a previous edition.

The text begins with a simple presentation of the fundamental physics of static electric-

ity, current electricity, cells and cell batteries, the condenser, magnetism and meters, electromagnetic induction, dynamos and motors, direct current, and dangers associated with electrical treatment. These topics are covered in the first ten chapters, which are brief. The well-trained physiatrist in the United States will find them rather superficial. Since the book is a product of English authors, American readers will not be familiar with some of the terminology used.

A chapter is devoted to the application of constant currents. Some of the applications are not widely used in this country. The technics of ion transfer are also presented. The uses of low frequency currents, faradic and sinusoidal, are presented together with a consideration of electrical treatments in baths. Aside from the presentation relative to the use of these currents in the stimulation of nerves and muscles, the rest of the material presents technics which are of questionable value and have not been accepted readily in the United States.

A chapter is devoted to long wave diathermy, but since such apparatus can no longer be used in the United States, this chapter will be of little interest to American physicians.

The physics of visible light, infrared and ultraviolet are briefly presented along with a discussion of the sources of infrared and ultraviolet radiation. The chapters devoted to ultraviolet therapy and the technic of applying ultraviolet light tend to present a conservative approach to a still controversial subject.

PSYCHIATRY FOR NURSES. By *Louis J. Karnosh*, B.S., Sc.D., M.D., Clinical Professor of Nervous Diseases, School of Medicine, Western Reserve University; Director of Neuropsychiatry, Cleveland Clinic with the collaboration of *Dorothy Mereness*, A.B., M.N., R.N., M. of Litt., Assistant Professor of Psychiatric Nursing, School of Nursing, Boston University; Formerly Instructor of Psychiatric Nursing, Neuropsychiatric Division, City Hospital, Cleveland; Formerly Assistant Professor of Psychiatric Nursing, School of Nursing, University of Pittsburgh. Fourth edition. Cloth. Price, \$4.50. Pp. 516, with illustrations. The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, 1953.

This text has been revised with one thought in mind, the importance of understanding and teaching the humanitarian aspect of psychiatric-patient-welfare as well as the usual form of terminology relative to the disease. The book is prepared as a basic text for use in the initial course of psychiatry for student nurses.

The questions at the close of each chapter are so designed that the instructor may use

them as a valuable teaching aid. German use of the questions can make for a more effective and lasting impression of the material, this being relevant to the students' need to retain more adequately knowledge studied by chapter-question examination.

The glossary is, purposely, brief. Those students interested in further investigation of psychiatric terminology and its application will seek further lexical material. The practical references mentioned will cover the present needs of the course of Psychiatry for nurses.

ESSENTIALS OF BODY MECHANICS IN HEALTH AND DISEASE. By *Joel E. Goldthwait, M.D., F.A.C.S., LL.D., Sc.D.*, Member, Board of Consultants, Massachusetts General Hospital; Ex-President, American Orthopaedic Association; Organizer and First Chief, Orthopaedic Service, Massachusetts General Hospital; Member, American Academy of Orthopaedic Surgery; Member, British Orthopaedic Association; *Lloyd T. Brown, M.D., F.A.C.S.*, President, Robert B. Brigham Hospital; Member, American Orthopaedic Association; Member, American Academy of Orthopaedic Surgery; Member, Board of Orthopaedic Surgery; Instructor in Orthopaedics, Harvard Medical School; *Loring T. Swaim, M.D.*, Secretary and Past President, American Rheumatism Association; Member, American Orthopaedic Association; Member, American Academy of Orthopaedic Surgery; Instructor, Orthopaedic Surgery, Harvard Medical School; Chief Orthopaedic Consultant, Robert B. Brigham Hospital; *John G. Kuhns, M.D., F.A.C.S., Sc.D.*, Member, American Orthopaedic Association; Member, Academy of Orthopaedic Surgery; Lecturer in Orthopaedic Surgery, Boston University Medical School. Instructor in Anatomy and in Orthopaedic Surgery, Harvard Medical School; Chief of Orthopaedic Staff, Robert B. Brigham Hospital. Fifth edition. Cloth. Price, \$6.00. Pp. 356, with illustrations. J. B. Lippincott Co., East Washington Square, Philadelphia 5, 1952.

The present volume represents the fifth edition since 1934. No subject presentation could survive the changing concepts of medicine during the past 20 years unless that presentation be based on a sound, enduring philosophy. The authors have for many years championed the recognition of correction of errors in body mechanics as constituting a valid treatment for many somatic complaints. The justification for the present edition is to reexamine the previously exploited thesis of the authors in the light of possible changes induced by the newer concepts of medical rehabilitation, as well as the influence of antibiotics and hormones on disease and disability states.

The volume is divided into a number of

sections. An excellent chapter deals with the various somatic types, the disease states thought to be characteristic of each, and the disturbances in body mechanics frequently found in each type. The authors' concept of proper body mechanics is adequately developed; in this the theme is repeatedly stressed that minor uncorrected alterations in body mechanics may ultimately induce symptomatic involvement of growth patterns and various of the body systems, of which the circulatory system, the abdominal and thoracic viscera, the nervous system and the arthritides are singled out for special attention. The authors' treatment of alterations in body mechanics involves the proper combination of rest, supports, muscle reeducation and exercises, all of which are keyed toward the objective of restoring the proper mechanical alignment of the body segments. The concluding chapter deals with the types of disturbances in body mechanics seen with the aged individual and what may be done to correct such disturbances. Each chapter is concluded with an adequate bibliography.

The text is written in an informal style and is easy to read. It is not, in some respects written too clearly, although, to be sure, nothing is lost by the necessary repetitive reading. Occasionally a specific conclusion is made or inferred from a broad, general statement which the non-medical reader may interpret as a proved fact rather than the belief of the authors. The following examples are cited: "Not only is little attention paid to such differences in structure but practically no consideration is given to what should happen to the function of the various organs when the easily demonstrable malposition of them is considered. Is it not possible that much of that which concerns chronic medicine has to do with the imperfect functioning of sagged or misplaced organs?" Many of the illustrations are obviously of ancient vintage and are scarcely up to modern standards of medical photography. While no one doubts that poor body mechanics can be improved, certain of the illustrations are quite unconvincing in this respect despite the accompanying legend which calls attention to improvement. Exception may be taken to two implications: the implication that physical therapy has nothing to do with body mechanics ("physiotherapeutic technics . . . have failed to improve or correct the alignment . . . of the whole body"); the implication that all improvement in chronic illness may be attributed to correction of errors in body mechanics and, conversely, that chronic illness is caused by errors in body mechanics. The excellent bibliography at the end of each chapter is of relatively little value as the text seldom refers to it; the reader must choose between reading none of it or all of it to verify statements made by the authors.

The foregoing comments detract nothing from the general excellence of the central theme of the book. In this day of medical specialization, far too frequently, treatment emphasis is placed on what the physician can do for the patient, not on what the patient can do for himself with proper medical guidance. Unfortunately, the physician who may unduly emphasize one phase of treatment will likely not see this volume, since it is not in his "line." Physicians, medical students, physical therapists and student therapists will find much profitable knowledge in this volume.

HEADACHES: THEIR NATURE AND TREATMENT. By *Stewart Wolf, M.D.*, Professor and Head of Department of Medicine, University of Oklahoma School of Medicine, Oklahoma City, and *Harold G. Wolff, M.D.*, Professor of Medicine (Neurology), Cornell University Medical College, New York. Cloth. Price, \$2.50. Pp. 177, with 7 illustrations. Little, Brown & Company, 34 Beacon St., Boston 6, 1953.

This book is written specifically for the nonmedical reader. It is essentially a non-technical summary of the finest book on headache, *Headache and Other Head Pain* by Harold G. Wolff. The language is simple and concise and can be easily understood by the lay reader.

In this volume, the common mechanisms of head pain and the factors responsible for their development are outlined. The importance of underlying nervous tension and emotional factors is stressed.

A good share of the discussion concerns migraine and other types of extracranial vascular headache. This is as it should be, since head pain due to excessive dilatation of the branches of the external carotid artery is by far the most common type, and often the most severe. Headache due to excessive muscle tension is also well covered. While organic types of headache are discussed, the authors have refrained from putting too much stress on such serious conditions as brain tumor and cerebral aneurysm as a cause of head pain. As a result, the tone of the volume is reassuring rather than frightening.

Since it is assumed that many of the readers will be persons afflicted with headache, a real attempt is made to show how "the patient can help himself." A few simple case reports are well chosen to illustrate some of the principles of headache production and the methods of management. The authors have wisely withheld discussion of specific forms of treatment and make it clear that the patient should consult his physician.

This book can be strongly recommended for the intelligent headache sufferer who wishes to learn more about his affliction. It is clear, concise, and authoritative.

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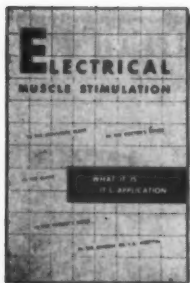


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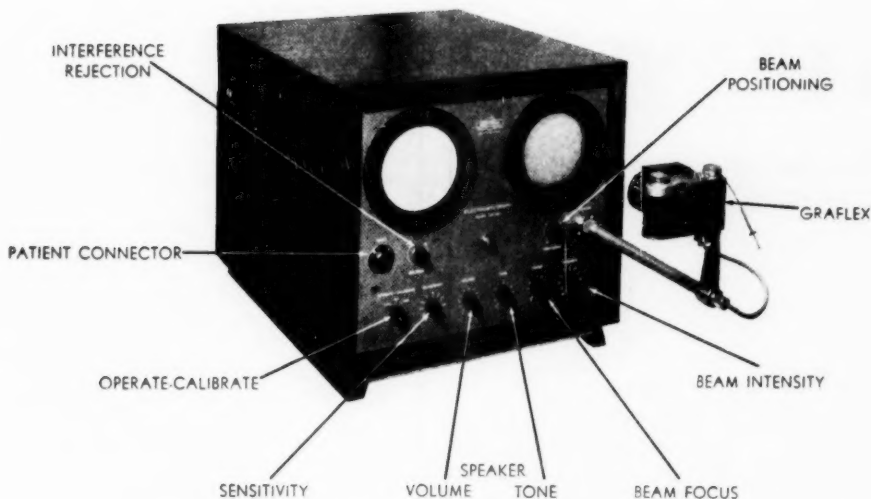
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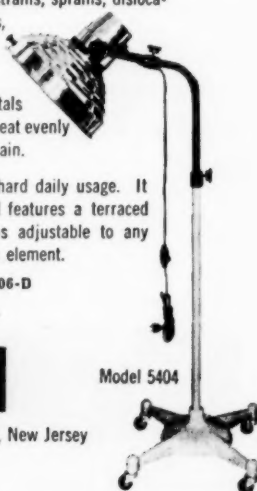
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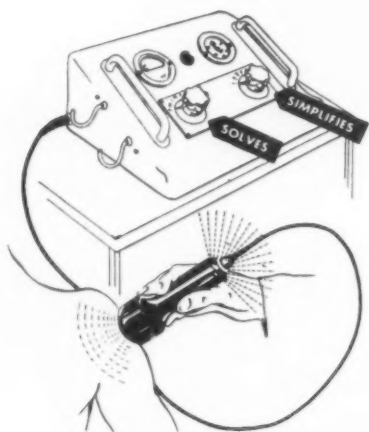
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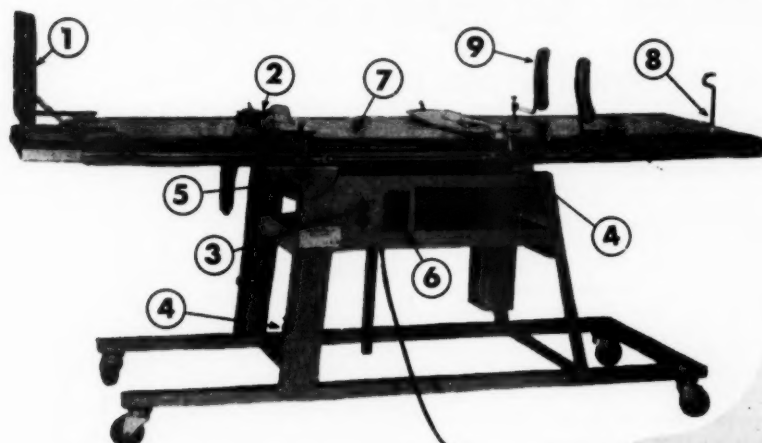
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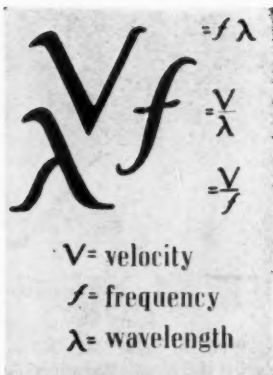
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To stimulate interest in the field of physical medicine and rehabilitation, the American Congress of Physical Medicine and Rehabilitation will award annually, a prize for an essay on any subject relating to physical medicine and rehabilitation. The contest, while open to anyone, is primarily directed to medical students, internes, residents, graduate students in the pre-clinical sciences and graduate students in physical medicine and rehabilitation. The Annual Awards Committee suggests that members of the American Congress and American Society of Physical Medicine and Rehabilitation bring this announcement to the attention of interested persons. The following rules and regulations apply to the contest:

1. Any subject of interest or pertaining to the field of physical medicine and rehabilitation may be submitted.
2. Manuscripts **must be** in the office of the American Congress of Physical Medicine and Rehabilitation, 30 N. Michigan Ave., Chicago 2, not later than June 1, 1954.
3. Contributions will be accepted from medical students, internes, residents, graduate students in the pre-clinical sciences, and graduate students in physical medicine and rehabilitation.
4. The essay must not have been published previously.
5. The American Congress of Physical Medicine and Rehabilitation shall have the exclusive right to publish the winning essay in its official journal, the ARCHIVES OF PHYSICAL MEDICINE AND REHABILITATION.
6. Manuscripts must not exceed 5000 words (exclusive of headings, references, legends for cuts, tables, etc.), and the number of words should be stated on the title page. An original and one carbon copy of the manuscript must be submitted.
7. The winner shall receive a cash award of \$200, a gold medal properly engraved, a certificate of award and an invitation to present the contribution at the 32nd Annual Session of the American Congress of Physical Medicine and Rehabilitation at the Hotel Statler, Washington, D. C., September 6-11, 1954.
8. The winner shall be determined by the Annual Awards Committee composed of four members of the American Congress of Physical Medicine and Rehabilitation.
9. All manuscripts will be returned as soon as possible after the name of the winner is announced.
10. The American Congress of Physical Medicine and Rehabilitation reserves the right to make no award if, in the judgment of the Annual Awards Committee, no contribution is acceptable. The Congress may also award certificates of merit to contributors whose essays may be considered second and third best submitted. Announcement of the winner will be made after the annual meeting. Officers and members of the American Congress and the American Society of Physical Medicine and Rehabilitation are not eligible for this award.



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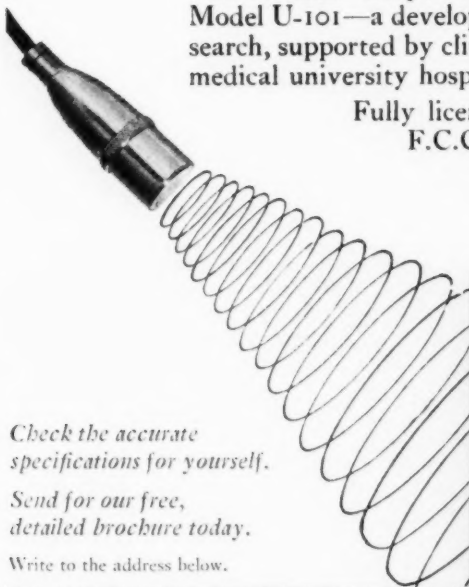
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